ANALYSIS OF THE SUPER COMPUTER DECISION PROCESS IN TARGET ACCOUNTS

INPUT

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ANALYSIS OF THE SUPERCOMPUTER DECISION PROCESS IN TARGET ACCOUNTS

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I

Introduction

I

Introduction

Amdahl Corporation sells and services Fujitsu Corporation's line of vector processing systems in the U. S. and Western Europe. In approximately five years, Amdahl has sold six systems — five in Europe and one in the United States.

A

Objectives

Amdahl Corporation asked INPUT to help determine the reasons behind the market penetration of its supercomputer.

INPUT developed and administered a questionnaire to help ascertain what customers want and make recommendations to Amdahl Corporation to improve its market penetration.

B

Scope and Method

Amdahl and INPUT identified three groups of target organizations:

- (Group A) Where Amdahl has lost proposals
- (Group B) Where Amdahl has been successful
- (Group C) Where there are prospects for supercomputer purchase

Research was carried out through a combination of on-site and telephone interviews.

- In the U.S., two organizations were interviewed on-site; the remaining 11 were interviewed over the telephone.

- In Europe, one organization was interviewed on-site; 10 were interviewed over the phone.

- All prospects were interviewed over the telephone. The questionnaire was modified to ask relevant questions for prospects.

Amdahl was not identified as the sponsor of the research.

II

Executive Summary and Recommendations

II

Executive Summary and Recommendations

EXHIBIT II-1

INTRODUCTION

Amdahl's Role

- Site Demographics
- Respondent Demographics
- Diverse Industries Use Supercomputers
- Supercomputers Share Data with Mainframes, Superminis, Minisupers

INPUT interviewed 34 sites across four key categories:

- Lost accounts (US)
- Lost accounts (W. Europe)
- Wins
- Prospects

The following matrix identifies the respondent categories and geographic locations:

Location & Number of Respondents

Category	United States	Western Europe	Total
Group A (Lost)	13	7	20
Group B (Won)	–	4	4
Group C (Prospects	10	-	10
Total	23	11	34

Managers or directors of R&D computing centers, division managers, and research scientists in these accounts were interviewed.

The survey represented a diverse range of industries – educational and research institutions, government agencies, transportation and utility firms, process manufacturing companies, investment banking firms, and discrete manufacturing companies.

Supercomputers share data with mainly IBM mainframes and DEC VAX superminicomputers. In several instances, engineering workstations are used for graphics output. Minisupercomputers connected to supercomputers were indentified in two instances.

Buyers consider nearly every manufacturer. However, for this sample, Cray, IBM, and Amdahl consistently made the list of finalists.

The decision takes two to eighteen months and users have a budget range of $5 to $20 million for this purchase. The purchase price averages near the low end, at $7.5 million.

Cray did not negotiate price at the time these machines were purchased (due to demand far exceeding supply). IBM negotiates the start date for payment, rather than the actual purchase price.

EXHIBIT II-2

PURCHASE DECISION

- Supercomputer Vendors Considered: Virtually All
- Short List: Cray, IBM, and Amdahl
- Length of Purchase: Range of 2-18 Months, Average of "6-9 Months"
- Target Price: Range of $5-$20 Million, Average of $7.5 Million
- Negotiated Price: Cray (No), IBM (Payment Start Date)

Although Data is Biased,
Price is Not a Key Factor

EXHIBIT II-3

"TOP 3" DECISION CRITERIA

- Losses (US): Speed/Performance, Available Application Software, and Cray-based NSF/Service Bureaus
- Losses (Eur): Price, Good Vectorizing Software, Available Application Software
- Wins (Europe): Good Vectorizing Software, Price/Performance, IBM Compatibility
- Prospects (US): Solve Problems, Cost Effective, Speed/Power

Overall, an Increasingly Business-Oriented
Decision; Needs In-House "Champion"

In short, buyers want power and cost effective computing solutions to existing problems. While R&D groups may need the machines, the accounting and financial people are becoming more involved to ensure a solid business decision.

- Quality vectorizing software is an issue, too. Better software will automatically vectorize a higher portion of the code, thus requiring less human intervention to fine tune the software.
- Application software is necessary to prevent overutilization of scarce in-house resources.

EXHIBIT II-4

"OTHER" PURCHASE DECISION CRITERIA

- Losses (US): Availability of Application Software, Networking Capabilities, Local Maintenance/Service, Long Life for CPU Architecture, Move from Separate Array Processor to Attached Processor
- Losses (Eur): Price, Hardware Maintenance, Software Maintenance, Confidence in Vendor's Survivability, Operating Costs
- Wins (Eur): Overall Reliability; Hardware Reliability, Software Reliability, Hardware and Software Maintenance, Availability of Application Software
- Prospects (US): Compatibility with Installed Cray, Vendor Commitment to UNIX

Application Software, Support, Reliability and Compatibility are Important

Vendor survivability, reliability, service and support are secondary user needs. Cost is mentioned again.

EXHIBIT II-5

ATTITUDE TOWARD JAPANESE-MANUFACTURED CPU

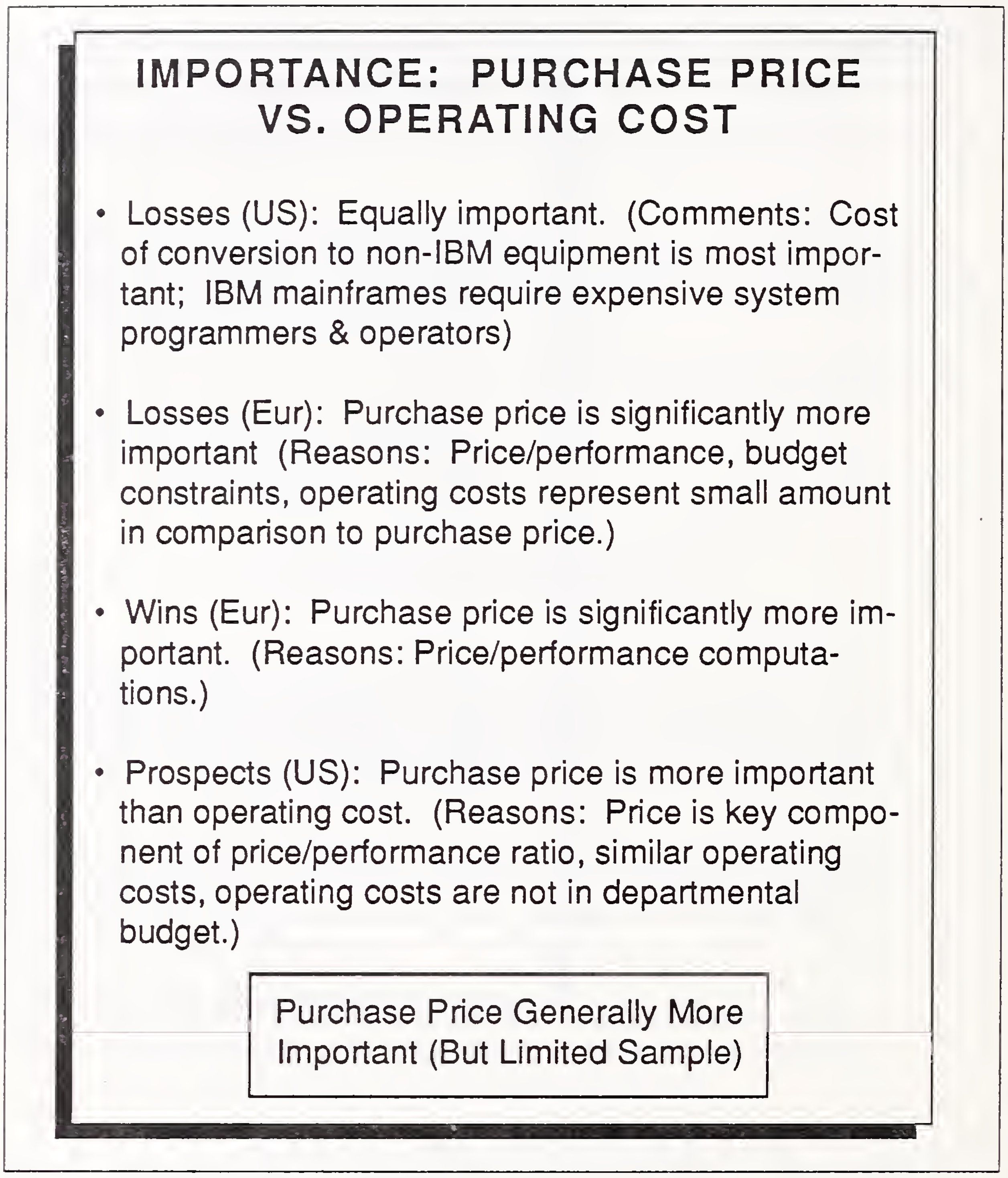
- Losses (US): BCS, U. S. Army (Aberdeen), Ohio Supercomputing Center & Fairchild Semiconductor Would Not Buy Japanese CPU (Reasons: State & Federal Government Funding; Political)
- Losses (Eur): Only Philips (of 4) would not buy a Japanese manufactured CPU (Philips views the Japanese as competitors.)
- Wins (Eur): No/Minimal Effect; 1 Positive (Quality).
- Prospects (US): Two of five indicated a negative effect (Reasons: Local management attitude, Harder to sell project to government if using a Japanese CPU.)

Detrimental in US
Not Significant in Europe

It appears that vendors take a pragmatic view toward machines made by a Japanese vendor. If it will hinder US government funding, or if it will be used in a region that is sensitive to foreign trade, then in these cases selling a Japanese machine is a liability.

Otherwise, in the scientific/technical market, the buy is based on benchmarks, price/performance, service, and perceived vendor risk.

EXHIBIT II-6



IMPORTANCE: PURCHASE PRICE VS. OPERATING COST

- Losses (US): Equally important. (Comments: Cost of conversion to non-IBM equipment is most important; IBM mainframes require expensive system programmers & operators)
- Losses (Eur): Purchase price is significantly more important (Reasons: Price/performance, budget constraints, operating costs represent small amount in comparison to purchase price.)
- Wins (Eur): Purchase price is significantly more important. (Reasons: Price/performance computations.)
- Prospects (US): Purchase price is more important than operating cost. (Reasons: Price is key component of price/performance ratio, similar operating costs, operating costs are not in departmental budget.)

Purchase Price Generally More Important (But Limited Sample)

Purchase price is generally more important than operating cost. Purchase price affects the price/performance ratio more than operating costs.

Conversion costs and systems programmer costs were considered important by some accounts where Amdahl lost. These same considerations would apply to any IBM or PCM machine.

EXHIBIT II-7

FUTURE USER NEEDS

- Losses (US):
  - Hardware: More power/speed, larger/faster main memory, improved price/performance
  - Software: Better vectorizing/code optimizing tools
- Losses (Eur):
  - Hardware: More capacity/larger main memory
  - Software: Insufficient data
- Wins (Eur):
  - Hardware: Faster scalar unit, more vector processing capability, more capacity/larger main memory, faster channels and peripherals, ease of network access
  - Software: Insufficient data
- Prospects (US):
  - Hardware: More capacity/larger main memory
  - Software: Compatible FORTRAN compilers that do better vectorizing

Larger Memory, Increased Capability, Easier Vectorizing

More capacity, faster channels, and faster peripherals were most often mentioned by users.

In the software area, better/faster FORTRAN-based vectorizing compilers are desired.

In theory, it's a great idea to have one supplier for mainframes and supercomputers. However, respondents indicate that they expect to deal with many suppliers as a result of increased application specialization.

EXHIBIT II-8

QUOTES ON ATTITUDE TOWARDS SINGLE SUPPLIER OF GENERAL PURPOSE 7 SUPER COMPUTERS

Advantages: "Same CPU does business and seismic data processing."
"Not having to learn another set of languages."
"Less vendors to deal with for service & support."

Disadvantages: "We are in an era of specialization and expect to use multiple vendors."
"No advantage seen (IBM to IBM equipment was most difficult conversion)."
"Too dependent on one supplier."

Good in Theory; Not Likely in Reality
IBM VF Add-On Changes Game

Decision Criteria by Category, (BACKUP INFORMATION)

Factor	Losses U.S.	Losses Europe	Wins Europe	Total
A. Overall				
- System Performance	1	2	1	4
- System Price	3	1	2 T	6
- System Reliability	2	3	2 T	7
B. Hardware				
- Performance	1	1	1	3
- CPU Reliability	2	2 T	1 T	5
C. System Software				
- Quality of FTN comp	1	1	2	4
- Compat with Existing M/F Op. System	3	2 T	1	6
D. Application Software				
- Ease of App. SW Devel	1	1	1	3
- Availabil of App. SW	2	2	2	6
E. Communications				
- Networking Capability	1	1	1 T	3
- Supports Certain Protocols	2	2	1 T	5
F. Support				
- Quality of Bug Fixes	2	1	1	4
- Overall Field Service Capability	1	3	2	6

Keys: Performance, FORTRAN Compiler, Ease of Application Software Development, Networking, Quality of Bug Fixes

Although the Company has a number of solid strengths, the perceived negatives outweigh the positives. The confusion about Amdahl's specialty, its (and IBM's) lack of application software, and a somewhat specialized architecture have led to a confused image.

EXHIBIT II-9

SUMMARY: AMDAHL

Plusses
- Cooperative, professional, flexible vendor
- Reliable, less expensive hardware
- Excellent vectorizing tools
- Very competent technical staff
- Frequently selected as a finalist

Minuses
- Company is not well known in the supercomputer market
- Confusion about specialization in business or scientific/technical computing
- Lack of third-party application software for technical computing environments
- Vectorized, not combination scalar/vector, architecture severely limits sales opportunities

Neutral
- IBM (not Cray) Compatibility
- Seen as "small" company

Risky Choice

For this sample, INPUT found tremendous customer loyalty to Cray. In fact, their comments tended to be relatively critical about all vendors except Cray.

They are the market leader and have capitalized on their head start. Respondents indicated that expensive systems, inflexibility on pricing, and reliability problems are offset by the availability of application software, good company to work with, and, very importantly, a balanced scalar/vector architecture. Seymour Cray astutely recognized that not all code can be highly vectorized, so his design included solid scalar performance.

EXHIBIT II-10

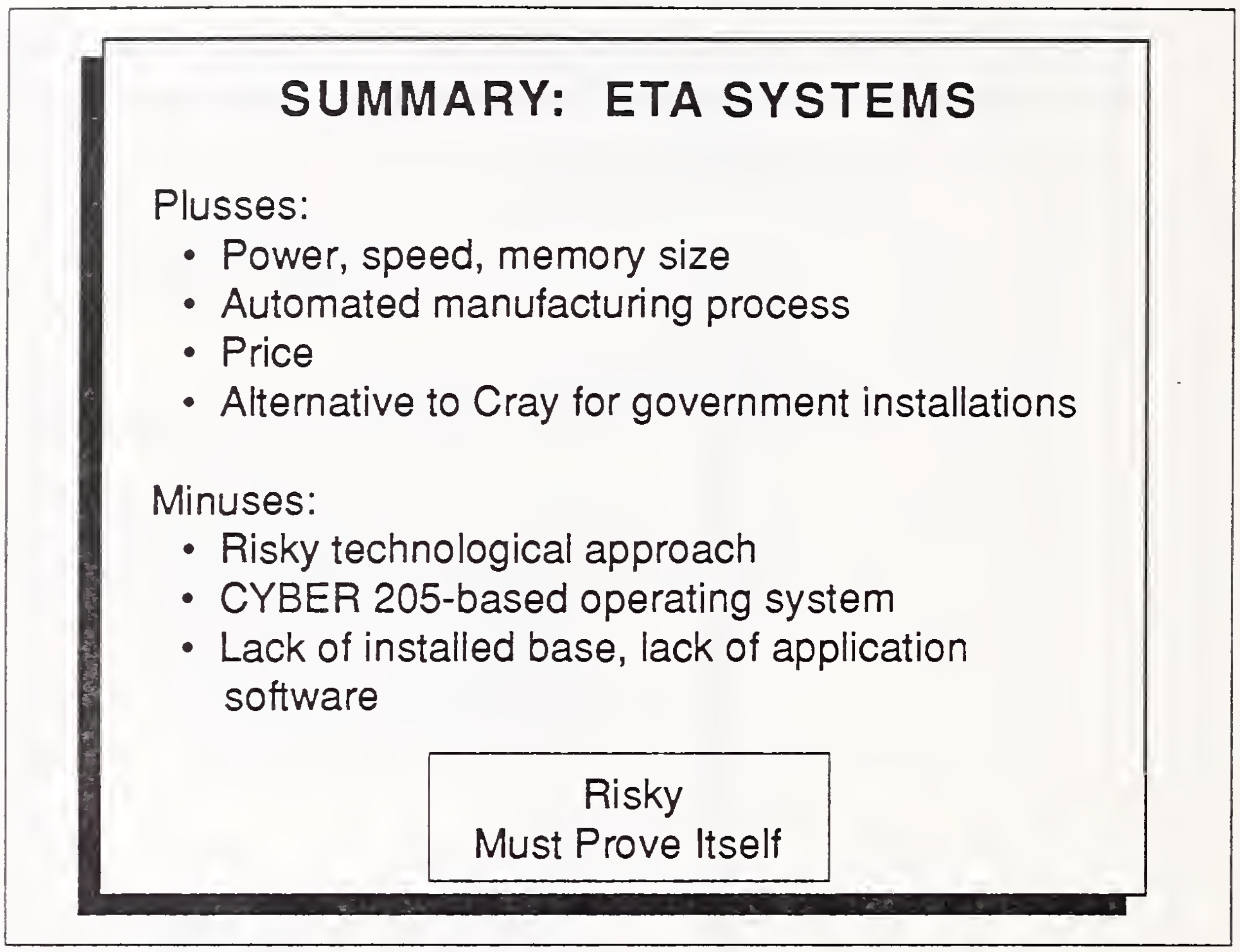
SUMMARY: CRAY

Plusses
- Perceived technology leader (selling futures)
- Largest installed base
- “Shrewd business people and image creators”
- General purpose scalar/vector architecture
- Speed, power, balanced I/O and computing capabilities
- Abundance of application software

Minuses
- Arrogant
- Expensive, not cost effective, and pricing inflexibility
- Vectorizing compilers and tools
- Hardware reliability

Safe Choice

EXHIBIT II-11



SUMMARY: ETA SYSTEMS

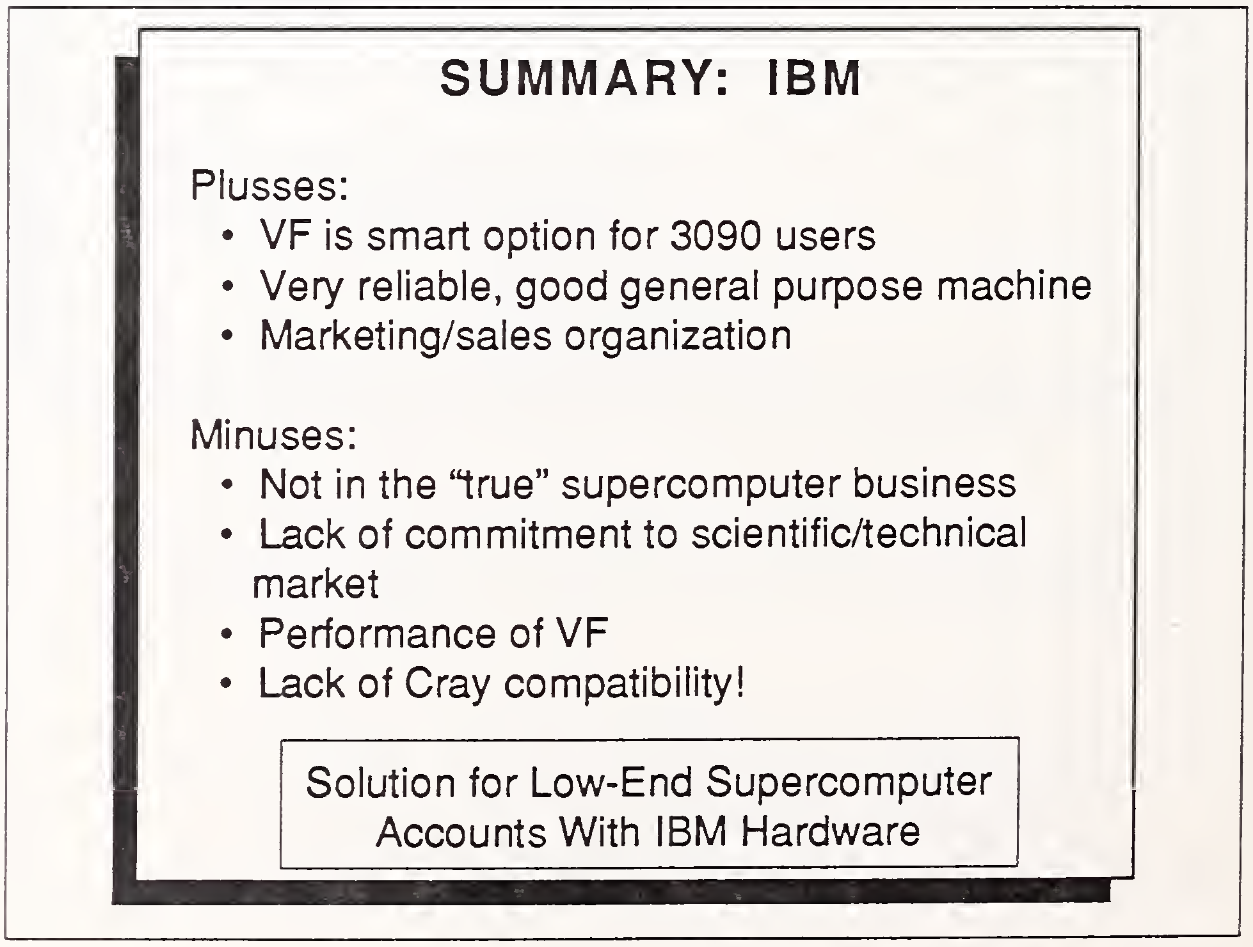
Plusses:
- Power, speed, memory size
- Automated manufacturing process
- Price
- Alternative to Cray for government installations

Minuses:
- Risky technological approach
- CYBER 205-based operating system
- Lack of installed base, lack of application software

Risky
Must Prove Itself

In short, ETA must prove itself. Note that while ETA has a poor operating system and a lack of application software, they may be a viable alternative for the US government, who cannot overly rely on Cray. To be "real," though, ETA needs installations in production environments.

EXHIBIT II-12



SUMMARY: IBM

Plusses:
- VF is smart option for 3090 users
- Very reliable, good general purpose machine
- Marketing/sales organization

Minuses:
- Not in the "true" supercomputer business
- Lack of commitment to scientific/technical market
- Performance of VF
- Lack of Cray compatibility!

Solution for Low-End Supercomputer
Accounts With IBM Hardware

While the system is certainly not the strongest performer, offering an add-on VF for existing 3090 installations is a solid marketing move. Clearly, IBM is not targeting the high end of the supercomputer market, but they can "move a lot of iron" by targetting the low end.

EXHIBIT II-13

SUMMARY: NEC

Plusses:
- Very advanced, powerful hardware
- "Potentially the strongest competitor due to vertical integration and company commitment to this market."

Minuses:
- Not well known
- High price
- Slow/inefficient operating system
- Slow disk drives and I/O capabilities
- Lack of application software

Very Risky
"Honeywell: Poor Choice for U.S. Partner"

NEC is beset by the same weaknesses as others – lack of application software, lack of name recognition. They must also share the burden of Honeywell, perceived as a weak US marketing partner for the scientific/technical market.

While Fujitsu manufactures a "screaming machine," two key issues arise:

- Why would an IBM shop buy a new system rather than an inexpensive IBM VF add-on?
- The architecture appears optimized for seismic data processing.

In the relatively short term, Amdahl can:

- Ensure strong communications links with IBM and DEC systems;
- Improve its vectorization software;
- Add a UNIX overlay to MVS, which is running on 5890 mainframes to reach users committed to UNIX.

Looking ahead, the next generation product should address the following:

- Larger/faster main memory;
- Improved price/performance;
- Add multiprocessing or parallel processing;
- Balance the scalar/vector performance for applications with minimal vectorization.

The next generation product should also address:

- Increased reliability;
- Operating costs (especially personnel).

It may be appropriate to consider building all or part of the next generation product in the US to become an "Americanized" company.

EXHIBIT II-14

PRODUCT RECOMMENDATIONS

Product (Hardware):

- Ensure strong communication linkages with IBM and DEC systems

Product (Software):

- Add UNIX overlay to operating system to target UNIX users
- Better vectorization/code optimization tools, especially in applications with less than 50% vectorization

Next Generation Hardware:

- Continue industry's technological progress
- Reduce the cost of ownership
- Consider building final assemblies in US to reinforce image as US company

Amdahl must improve corporate marketing. Specifically:
- Strengthen Amdahl name recognition;
- Straighten out confusion about emphasis on business or scientific/ technical markets.

Amdahl must seek applications other than seismic data processing:
- Find application software;
- Run benchmarks;
- Target those niches with best performance and solid 3rd party application software.

Work more on third-party application software vendors:
- Develop relationships;
- Validate that the software runs on Amdahl VPs;
- Publish list of validated software.

Be prepared to deal with buyers' perceived higher risk with Amdahl. Sell Amdahl's U.S. capabilities by addressing:
- the number of US employees;
- the technical expertise of its U.S. employees;
- Amdahl's U.S.-based consulting, technical training, other services;
- the number of U.S. support centers;
- and emphasizing U.S. hardware and software maintenance personnel;
- and the fact that Amdahl is Fortune 500 company, growing, profitable.

EXHIBIT II-15

MARKETING AND SALES RECOMMENDATIONS

Marketing
- Corporate Image: Business DP vs. Scientific/ Technical DP
- Emphasize third party application software: Expand applications beyond seismic data processing
- Address perceived higher risk
- Target service bureaus and universities as leading edge
- Benchmarks are not only a technical process; use as a marketing aid

Sales Process
- Develop separate supercomputer sales *process:*
- Bring reputable third-party application software vendors into sales process to assist
- Out-IBM IBM

Modify the sales process to fit the scientific/technical market.
- Consider separate sales team familiar with R&D sales of technical computers.
- Add technical expert(s) to existing or new sales team.
- Establish contact with customer's top management.
- Pre-sell future products to sell current generation.
- Select target reference accounts and donate or heavily discount systems to penetrate accounts.
- Think through hardware configuration internally before proposal commitment.

From our discussions, we learned that successful benchmarks in the users' eyes are the result of many vendor factors successfully coming together.

- Performance optimization is important.
- Vendors should use their most skilled technical personnel in benchmarking.
- Headquarters should support the field in this area.
- Efficient software compilers yield performance dividends.
- Treat benchmarks as part of the marketing process.

Finally, Amdahl must "out-IBM IBM" in order to be successful. INPUT suggests:
- Probe for user needs.
- Presentations must address user needs, not someone's solution to what may be needed.
- Get support from senior management.
- Bring in sales "closers."

III

Research Findings
Group A (Losses)
United States

III

Research Findings Group A (Losses) United States

A

Demographic Information

To learn more about why Amdahl lost proposals, the following types and numbers of organizations were interviewed in the U.S.:

- Seven Commercial Businesses
- Two Federal Government Agencies or Suppliers
- Four Educational Institutions

As of the date this report was commissioned, all of Amdahl's vector processors were sold in Europe. (Subsequently, one VP was sold to the U.S. affiliate of a European company with Amdahl VPs installed.) INPUT interviewed four of the five target sites identified by Amdahl.

INPUT counted a total of twenty-five supercomputers installed at twelve U. S. sites, since some sites have installed more than one supercomputer. Of this total, Cray is the clear leader with eighteen installed supercomputers.

- The Cray X/MP is the most widely selected model, with six installations.
- IBM installed three model 3090 VFs.
- Floating Point Systems (FPS) installed three model 264 attached processors.
- Tesseract installed one model T-20 supercomputer (which is based on FPS and Inmos Transputer technology).

Cray has been the machine of choice in production and government processing environments.

- Of the seven U. S. production environments, Cray has 5 and IBM has two installations.

- In the government sector, Cray has all installations, either sold directly or through Boeing Computer Services, a systems integrator.

Educational institution installations are more diverse — IBM, Cray, Floating Point Systems, and Tesseract have at least one machine installed.

Supercomputers share data mainly with DEC VAX and IBM 30XX computers and, to a lesser extent, Data General Eclipse superminicomputers.

- However, supercomputers now share data more with workstations (Apollo, Apple, Cadnetix, Daisy, Silicon Graphics, and Sun) than mainframes or superminis.

- Also, supercomputers are beginning to share data with the new class of minisupercomputers (Alliant, Convex, and Scientific Computer Systems), a trend which is expected to increase.

EXHIBIT III-1

GROUP A (LOSSES)
U. S. DEMOGRAPHIC INFORMATION

- Thirteen organizations; twenty-five installed super computers
- Production and Government Environments Use Cray
- Educational Institutions Are More Diverse
- Supercomputers Share Data Mainly With:
  - IBM 30XX Mainframes
  - DEC VAX Superminicomputers
- Supercomputers are Starting to Share Data With:
  - Various Workstations (Sun, Apollo)
  - Minisupercomputers (Alliant, Convex)

B

Purchase Decision

Vendors Considered

Interviewees at least considered virtually every supercomputer and near-supercomputer vendor before selecting finalists. Companies considered include: Alliant, Convex, Denelcor, ELXSI, Floating Point Systems, Honeywell/NEC, National Advanced Systems, and Scientific Computer Systems.

While based on a limited sample, Cray, IBM, and Amdahl had the highest percentage of initial vendors being selected as finalists:
- Cray was selected in 60% of instances;
- IBM was selected in 58% of instances;
- Amdahl was selected in 50% of instances.

Remaining vendors were selected as finalists in less than 30% of the cases.

EXHIBIT III-2

GROUP A (LOSSES) PURCHASE DECISION

- Length of Cycle
  - Range: 2 - 18 months
  - Mean: 8.8 months
  - Median: 6.5 months
  - Mode: 6, 12, 18
- System Target Price
  - Range: $5 - $20 million
  - Mean: $7.5 million
  - Median: $7.5 million
  - Mode: $5 - $7.5 million
- Was Price Negotiated?
  - Yes (6)
  - No (8)
- IBM Price Negotiation: Payment Start Date

In general, the decision cycle took between six and nine months, whether the buyer used a sealed bid process or not.

The length of the purchase decision varied with the nature of the decision to be made. Shorter decision cycles were evident in instances where the buyer favored a specific vendor through previous association such as timesharing. Generally, Cray benefitted most from this situation.

Organizations expected to spend in the neighborhood of $5.0 - $7.5 million for their supercomputer systems, with some respondents indicating a budget of up to $20 million for this purchase.

In slightly more than half the instances, the price was not negotiated. However, this is attributable to strong demand for Cray computers and that company's policy of not discounting.

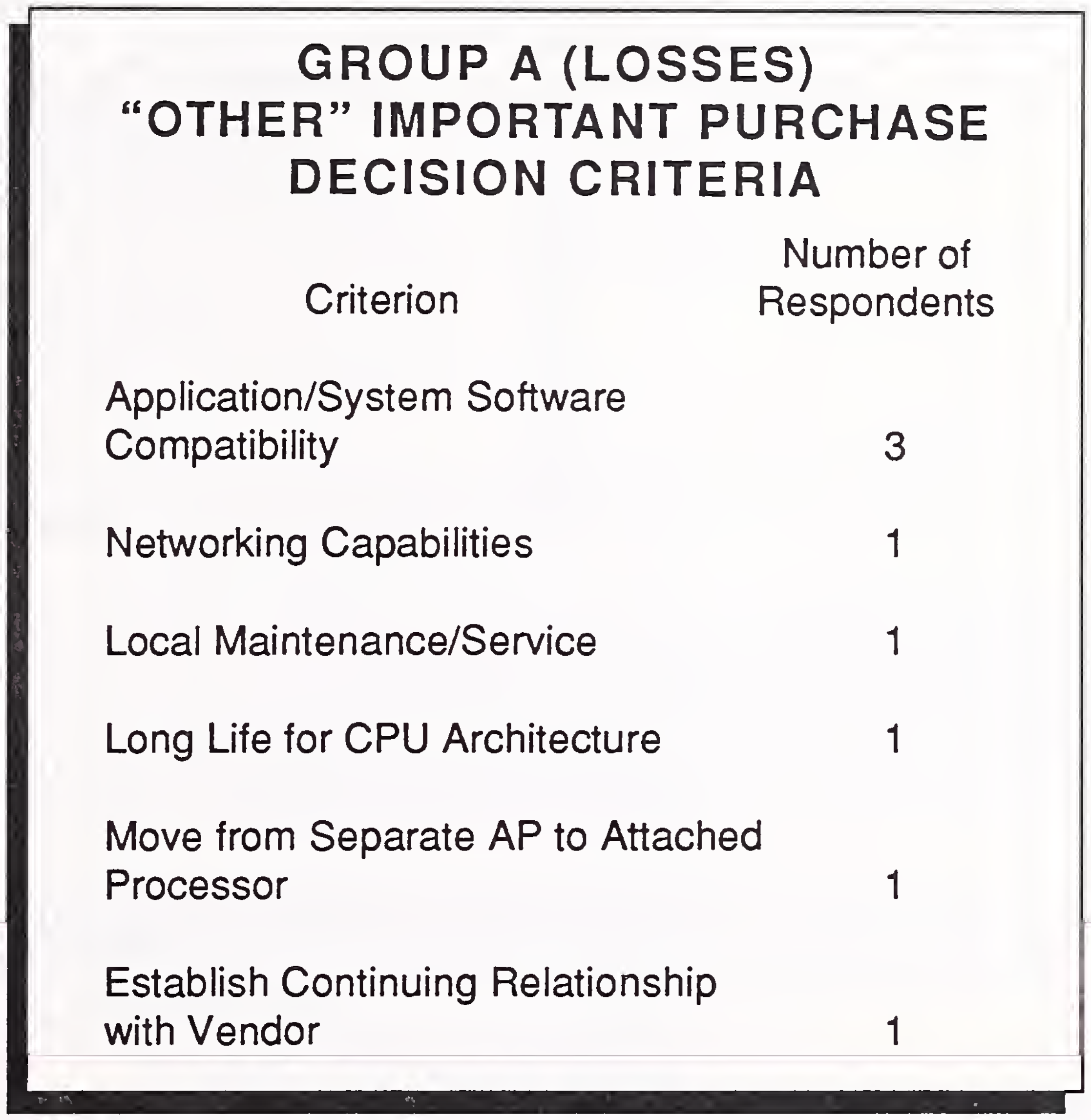
- On the other hand, IBM does not directly offer discounts but will negotiate the date when the payments for the system begin. Respondents indicated IBM is flexible on the "start date" for the 3090 VF, compared to traditional commercial installations.
- Respondents with other installed supercomputers did not answer this question; thus no information is available on which vendors negotiated price.

EXHIBIT III-3

GROUP A (LOSSES) "TOP 3" PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	
Power/Performance/Speed	11
Application/System Software Compatibility	11
SECONDARY	
Organization/Budget Support	5
Price/Performance	5
Business Reasons	5
Ease of Installation/Upgrade	4
Support/Service	3
Price	3
TERTIARY	
Availability/Delivery	1
Interactive Graphics Operation	1
TCP/IP Compatibility	1

EXHIBIT III-4



GROUP A (LOSSES) "OTHER" IMPORTANT PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
Application/System Software Compatibility	3
Networking Capabilities	1
Local Maintenance/Service	1
Long Life for CPU Architecture	1
Move from Separate AP to Attached Processor	1
Establish Continuing Relationship with Vendor	1

INPUT asked qualified respondents an open ended question to identify the "top three" purchase decision criteria used before buying their organization's supercomputer.

The two primary criteria — speed/performance and software compatibility — are expected responses based on the nature of scientific/technical computing and Cray's large installed base.

Note the high number of business-related responses — budgets and organizations are in place; meeting internal/external user demands; and price/performance calculations — indicating the "sell" is not based strictly on technical issues. Installing a supercomputer is a major strategic, business action.

- Please note, too, that "price" ranks at the bottom of the secondary criteria.
- Exhibit III-4 further validates the importance of compatible system/application software in IBM and Cray purchase decisions.

EXHIBIT III-5

GROUP A (LOSSES)
CHANGES IN
DECISION CRITERIA

No: 13

Yes: 4

Specific Changes

- Business Related (Broaden User Base to Get Funding; Financing Sources; Location of Facility) (3)
- After Cray Benchmarks, Raised issues of User Interface & Operating System (1) (User purchased different model Cray)
- Difficulty of Vectorizing "Old" FORTRAN Code for Technical Applications Affected CPU Choice (1)

Once decision criteria were established, generally by a committee, the buyers stayed with those criteria. Only four of seventeen respondents indicated some change (one identified two changes) in decision criteria at some point in the decision process.

Three of the five responses are business-related. One organization changed Cray models. However, one response is especially important to Amdahl.

- PG&E bought an IBM 3090 VF rather than Amdahl partially due to IBM's superior vectorizing FORTRAN compiler, which showed up in benchmark testing. By their own admission, PG&E's codes were older and more difficult to vectorize than most.
- PG&E also did not want to assume the risk associated with buying a low serial number system.

Organizations contacted with more than one respondent were consistent in answering the question regarding the effect of a Japanese-manufactured CPU on the purchase decision.

Of the twelve organizations responding, only four organizations indicated that a Japanese-made CPU posed any purchase problems. The four organizations and their reasons for not selecting a Japanese-made supercomputer follow:

- U.S. Army (Aberdeen)
- Boeing Computer Services (as system integrator for select U.S. Government purchases)
- Ohio Supercomputing Center
- Fairchild Semiconductor

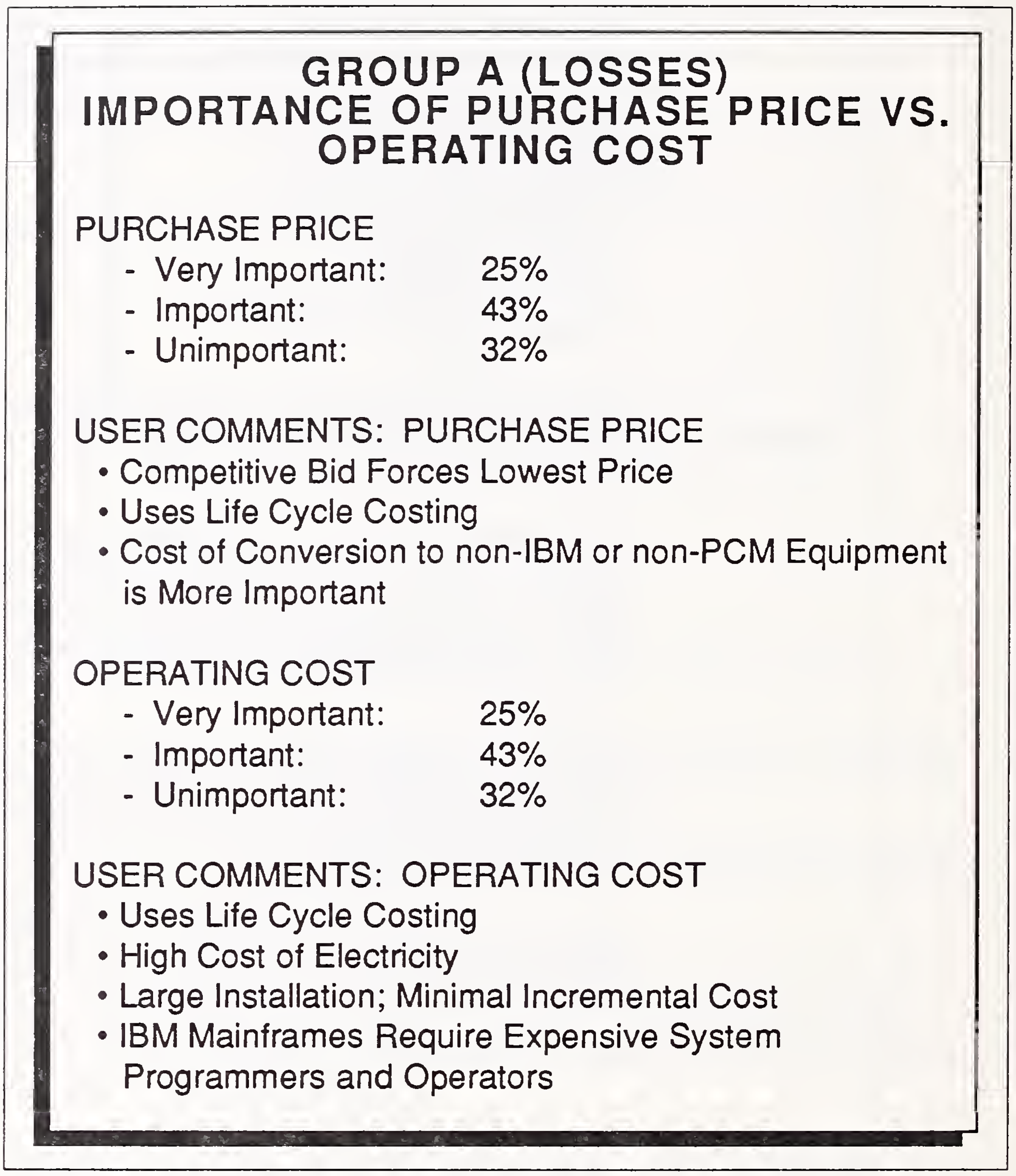
Aberdeen indicated that the decision came from higher up in the government not to consider a Japanese-built CPU.

BCS respondent indicated that the government is not buying Japanese machines unless they have an order of magnitude greater performance than U.S.-built machines, which hardly seems likely since no supercomputer vendor currently sells a machine that much more powerful than competitors.

Ohio Supercomputing and Fairchild Semiconductor cited regional and individual patriotism and nationalism reasons, respectively, for their refusal to buy Japanese.

Eight organizations did not see this as a problem in the purchase decision and one organization was not asked.

EXHIBIT III-6



GROUP A (LOSSES) IMPORTANCE OF PURCHASE PRICE VS. OPERATING COST

PURCHASE PRICE
- Very Important: 25%
- Important: 43%
- Unimportant: 32%

USER COMMENTS: PURCHASE PRICE
- Competitive Bid Forces Lowest Price
- Uses Life Cycle Costing
- Cost of Conversion to non-IBM or non-PCM Equipment is More Important

OPERATING COST
- Very Important: 25%
- Important: 43%
- Unimportant: 32%

USER COMMENTS: OPERATING COST
- Uses Life Cycle Costing
- High Cost of Electricity
- Large Installation; Minimal Incremental Cost
- IBM Mainframes Require Expensive System Programmers and Operators

The numbers in Exhibit III-6 don't tell the whole story. Overall, respondents consider both purchase price and operating cost relatively important. However, the comments indicate that:

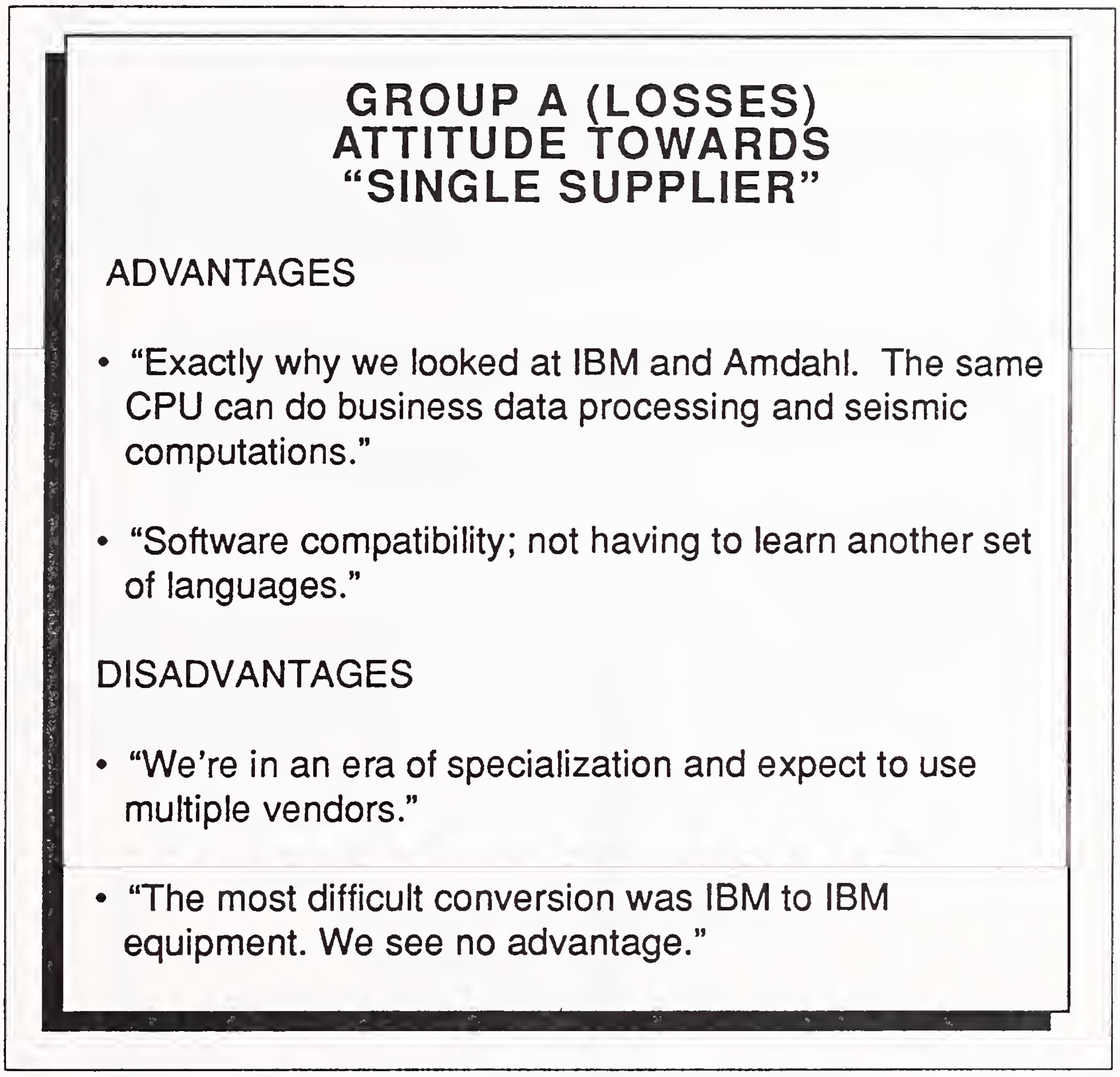
- Life cycle costing, which factors purchase price and operating cost into the equation, is widely used.

- Pricing is important to those organizations using competitive bidding.

- Conversion costs, if appropriate, can be more important than purchase price or operating cost.

- Larger installations see the incremental operating cost of a supercomputer as relatively unimportant.

EXHIBIT I-1



GROUP A (LOSSES) ATTITUDE TOWARDS "SINGLE SUPPLIER"

ADVANTAGES

- "Exactly why we looked at IBM and Amdahl. The same CPU can do business data processing and seismic computations."
- "Software compatibility; not having to learn another set of languages."

DISADVANTAGES

- "We're in an era of specialization and expect to use multiple vendors."
- "The most difficult conversion was IBM to IBM equipment. We see no advantage."

Users with IBM or PCM equipment would favor using one supplier while mixed-vendor installations actually expect specialization by various vendors.

Since few installations do scientific/technical/ engineering data processing on the same systems as business data processing, the likelihood of vendor specialization is more common.

Use of Benchmarks in Purchase Decision

Eleven of thirteen organizations required technical benchmarks as part of the decision process. The two users not using benchmarks knew other supercomputer users in their industry and could learn key strengths and weaknesses from personal contacts.

The fastest overall benchmarks were turned in by Cray; Amdahl was second; IBM came in third.

Sales Process

Cray (five mentions) and Amdahl (three mentions) best handled the sales process. Interestingly, the lack of customer visits by vendor executives did not seem to affect the outcome. However, the local sales representative and the regional manager must be sure to cover all bases.

A successful sales process consists of:
- Solid knowledge of own products and competitors
- Knowledge of the customer's applications & industry
- Ascertaining the customer's needs

EXHIBIT III-8

GROUP A (LOSSES) FUTURE USER NEEDS

Criterion	Number of Respondents
PRIMARY	
More Power/Speed	9
Larger/Faster Main Memory	4
Improved Price/Performance	4
Better Vectorization/Code Optimization Tools	3
Parallel Architecture	3
SECONDARY	
Multiprocessing Capability	2
Reduced Cost of Ownership	2
High-Speed I/O2	
UNIX	2
Improved Performance in Scalar/VectoR Applications	2

- Writing a proposal that addresses the customer's needs
- Good management of the benchmark process
- Effective management of the on-site visit
- Early participation in the process by field and headquarters technical staff members
- Sales representative/manager contact with division GM or president

C

Future Needs and Directions

Users needs can be summarized as a variant on the "bigger, faster, cheaper" theme that is indigenous to high- performance computing.

- Users want two specific items: More power/speed and a larger main memory.

- What is interesting to note is the high ranking for improved price/performance, the businessman's way of saying cost effective computing. Technical operations will continue to be influenced by the accountants.

EXHIBIT III-9

GROUP A (LOSSES)
1 - 2 YEAR
PURCHASE/UPGRADE PLANS

- Will Purchase Additional Supercomputer?
  - Yes: 7
  - No: 5

- Do you Plan to Upgrade Your System?
  - Yes: 8
  - No: 4

- Most Mentioned System Upgrades
  - More Memory and More Processors (3)
  - More Memory (2)
  - More Processors (2)
  - Next Generation Cray (1)

Selling one supercomputer into an account builds a steady revenue stream.

Nearly two-thirds of user sites plan to either upgrade their supercomputer, buy another supercomputer, or some combination.

Among system upgrades, adding memory and processors is most often mentioned, followed by adding memory or processors. A modular hardware architecture facilitates user upgrades.

D

Vendor-Related Information

Introduction

INPUT and Amdahl agreed to ask respondents' opinions about the following vendors (listed alphabetically):

- Amdahl
- Cray
- ETA
- IBM
- NEC
- Others

The following information is presented for each vendor listed above:

- Overall Opinion
- Strengths
- Weaknesses
- Sales Process (Amdahl and Cray only)
- Benchmarks
- Meet/Did Not Meet Customers' Expectations (Cray and IBM only)

Specific comments on the sales process follow discussion of each vendor.

EXHIBIT III-10

GROUP A (LOSSES)
USER COMMENTS: AMDAHL CORPORATION

OVERALL
- Does Not Sell a True Supercomputer (2) (BCS & DuPont)
- Limited Success in the U.S. (2)
- Current Machine is Obsolete/Outdated
- Seen as #2 in Technology (4 vs. 2 mentions each for NEC & IBM)

STRENGTHS
- Technical Staff (5)
- IBM Compatibility (3); Cheaper/Faster Than IBM (2)
- Handling of Sales Process (3)
- Flexibility in Price Negotiation (2)
- Fujitsu Financial Backing (2)
- Market Share in Engineering/Scientific Computing (2)
- Good Compilers & Diagnostic Printouts; Excellent Vectorizing Tools
- Willingness to Bring Industry Experts in for Application

WEAKNESSES
- Marketing/Sales Issues (8)
- Lack of U.S. Installed Base (8)
- IBM Compatibility (3)
- Lack of Hardware Upgrade Path

SALES PROCESS
- Second Best at Handling the Sales Process (3 mentions)

BENCHMARKS
- Second Fastest Benchmarks Overall
- “Poor Performance in Short Vector Jobs” (Pitzer; OSU)
- “Excellent Internal Diagnostics” (Ruddock; LSU)
- “Good Memory Architecture”
- “Can Tell Best What Percent of Job Can Be Vectorized” (Ruddock; LSU) Amdahl evenly blends its strengths and weaknesses.

Major strengths include: flexibility; good technical people; willingness to bring in outside experts; perceived Fujitsu financial backing; making the "short list"; and out-performing IBM.

Its weaknesses boil down to four: lack of consistent company image (differences between selling a commercial vs. scientific/technical system); lack of installed base; uneven performance in jobs with less than 50% vectorization; and lack of scientific/technical application software. Furthermore, why would a company buy an entire Amdahl system when they can buy the IBM VF add-on for the 3090?

However, people are confused about Amdahl's company image — some respondents noted Amdahl as a leader in scientific/technical applications; others said the company does not know how to market to that area.

EXHIBIT III-11

GROUP A (LOSSES)
USER COMMENTS: CRAY

OVERALL
- Excellent Company and Products
- Arrogant
- Shrewd Business People and Image Creators
- Seen as Technology Leader (13 vs. 2 mentions for Amdahl)

STRENGTHS
- Handling of Sales Process (5)
- Market Focus
- Working Technology
- Balanced Product Performance

WEAKNESSES
- Tools and Compilers for Vectorizing (3)
- Expensive
- Growing Too Fast
- Too Many Hardware Architectures

SALES PROCESS
- Best handled the sales process (5 mentions)

BENCHMARKS
- "Best Staff Ability to Vectorize Problems"
- "Best Performance on Short Vector Jobs"

OTHER COMMENTS (One Mention Each)
- Most Application Software
- Balanced Machine (I/O and Computing)
- UNICOS is Good O.S.

SURPASSED USER EXPECTATIONS
- Reliability (2)
- Time Necessary to Get System Installed and Running (1)

DID NOT MEET USER EXPECTATIONS
- Vectorization of Some Software (1)
- Hardware Reliability (1)
- Ease of Use (1)

One user's statement best summarizes Cray: "They are shrewd business people and image creators, having created the image that they build the fastest supercomputers around."

They also have undeniable momentum. In response to why people believe Cray is, in fact, the technology leader, respondents gave the following responses (in decreasing order):

- Impressive Future products (4)
- Largest installed base (3)
- Makes Fastest Systems (3)
- Product/Market Focus (2)
- Best Technology (2)

What is significant is that two of the five factors listed have nothing to do with technology! Technology itself is tied for third-place mentions. An image of success appears to breed success.

Cray's strength appears to be its general purpose supercomputer architecture, which combines scalar and vector processing capabilities. Other machines may be faster in highly vectorized applications, but limitations on vectorizing code limit performance of competitors' supercomputers. Cray's balanced (I/O & computing) architecture enhances its performance.

Other advantages include abundant application software and a "mystique" about the product and some classified applications.

EXHIBIT III-12

GROUP A (LOSSES)
USER COMMENTS: ETA SYSTEMS

OVERALL
- Must install systems in production environments; must prove itself
- Will be Strong Only in Niche Applications
- Will be a Cray Competitor in Government Accounts
- Seen As Tied With IBM for 3rd Place in Technology

STRENGTHS
- Hardware (Primarily Speed and Memory Size) (7)
- Automated Manufacturing Process

WEAKNESSES
- Software/Operating System (5)
- Based on CYBER 205 Architecture (3)
- Risky Technological Approach (2)
- No Installed Base (2)

BENCHMARKS
- No information available

In short, ETA has its work cut out. But the company is virtually guaranteed some installations for the U.S. government, which is reducing its dependence on Cray.

While the operating system, the overall architecture, and lack of application software may be weaknesses, they do not appear overly detrimental. More important to ETA is the installation and support of systems in production environments. See Exhibit III-12 for details.

Its speed and memory size will make it fast although its architecture appears to limit its use to certain niches. Cray remains the leader in general purpose supercomputers.

EXHIBIT III-13

GROUP A (LOSSES)
USER COMMENTS: IBM

OVERALL
- Not in High-End Supercomputer Market (6)
- Targeting Low-End Supercomputer Market (3)
- VF is Inexpensive Way to Supercharge 3090
- Conflicting Price/Performance Comments

STRENGTHS
- Marketing/Sales Organization (7)
- Good General Purpose Scalar/Vector Machine (5)
- Reliability (2)

WEAKNESSES
- Lack of Commitment to High-End Supercomputer Market (3)
- Performance of Vector Processing Hardware (3)

BENCHMARKS
- "Difficult to Get Running; Then Ran Well" (Pizante; GSI)
- "FORTRAN compiler had problems" (Ruddock; LSU)
- "Highly vectorized problems do not run well" (Ruddock; LSU)
- "Only 1.4 - 1.5 times the performance of Amdahl 5860" (Harding; U of Michigan)

SYSTEM EXCEEDED USER EXPECTATIONS
- Reliability (4)
- Vectorizing FORTRAN Compiler (1)

DID NOT MEET USER EXPECTATIONS (1 mention each)
- Receiving Timely, Detailed Documentation
- A Bit Slower Run Time
- Performance in Scientific Subroutines

Users clearly believe IBM is not in the high end of the supercomputer business. However, an accurate statement is that IBM targets the much broader low end of the supercomputer market with a relatively inexpensive add-on 3090 turbocharger (VF). Users believe this approach is viable since the machine offers good scalar/vector performance.

While the price of the VF is inexpensive and the machine is reliable, some user conflict exists when comparing IBM's price/performance to other vendors' solutions.

IBM's marketing efforts have started adopting to the scientific/technical market or, rather, to those existing IBM users who want, inexpensively to add processing power for more compute intensive applications.

While offering a cost effective approach, IBM's vector facility is not infallible. Three users noted its performance was less than what is needed.

EXHIBIT III-14

GROUP A (LOSSES)
USER COMMENTS: NEC CORPORATION

OVERALL

- "Potentially the strongest competitor due to vertical integration and NEC commitment to this market"

STRENGTHS

- Hardware Technology (5) ("Hottest System on the Market")
- Customer Sensitivity
- Support of Japanese Government

WEAKNESSES

- Different Culture (4)
- Slow/Inefficient System Software (2)
- Slow I/O and Disk Drives
- High Price
- Honeywell as U. S. Marketing Partner

BENCHMARKS

- No information available

In general, users were not familiar with the NEC SX-2 supercomputer, since little information has been released to date. From a marketing perspective, one person boldly stated that Honeywell is not the best U.S. marketing partner for NEC.

While marketing is a definite weakness, the perception of very advanced hardware technology is a definite strength. NEC's and the Japanese government's commitment to this market is also a plus.

However, apparent weakness include: slow/inefficient system software; slow disk drives and I/O capabilities; and a very high price tag (estimated at $22 million). Sophisticated users are no longer sold by the fastest hardware. (If that were the case either the new FPS system, based on the Inmos Transputer, or the Thinking Machines Corporation system, would be the market leader. Such is not the case.)

EXHIBIT III-15

GROUP A (LOSSES) SALES PROCESS

- Lack of Visits by Vendor Executives Indicate this is a Minor Factor. However, Sales Rep or Regional Manager Must Cover All Bases.
- Keys to Success
  - Sales Rep's Knowledge of Own & Competitors' Products
  - Rep's Understanding of User Application
  - Rep's Presentation Must Address Customer's Needs
  - Effective Proposal Development and Writing
  - Manage Benchmark Process
  - Manage On-Site Visit
  - Early Participation by Field and HQ Technical Staff

Discussion of the sales process logically follows the summary of comments about each vendor.

Four respondents indicated they visited with executives of various vendors either at their site or at the vendor's site. There is no clear pattern of the effect of executive visits. In fact, federal and state government organizations, public utilities, and certain large companies have purchasing procedures prohibiting contact with company executives.

The local sales rep and sales manager hold the keys to successful supercomputer sales. In short, they must:

- listen to the customer to learn the exact application and future direction of the computing environment;
- involve the technical staff early in the process to help learn user needs and specific technical requirements;
- think through how to meet that requirement;
- write and deliver an effective proposal which addresses the customer's needs;
- and build support through all levels of the organization for the purchase and that company's product.

EXHIBIT III-16

GROUP A (LOSSES) BENCHMARKS

- 11 of 13 Organizations Required Benchmarks
- Fastest Benchmarks:
  - 1st Place: Cray (6 mentions)
  - 2nd Place: Amdahl (4 mentions)
  - 3rd Place: IBM (2 mentions)
- Best Job in Benchmarking: Cray (3), Amdahl (2), IBM (1)
- Reasons for Successful Benchmarking:
  - Performance Optimization (Cray)
  - Most Skilled Technical Personnel (Cray; Amdahl)
  - Best Headquarters Support (Cray)
  - Most Efficient Compiling (Cray)
- Benchmark Criteria
  - Combination of Throughput and Current Job Performance (3 mentions)
  - Throughput (2 mentions)
  - Combination of Current and Future Job Performance (1 mention)

Eleven of thirteen organizations required benchmarks before the purchase. The other two organizations asked others in their industry about vendors and performance in specific applications.

Since these supercomputers are used mainly in production environments, throughput and performance for current jobs (rather than performance for a mix of current and future jobs) was the most important benchmark criterion.

Comments about specific vendors' benchmarks were included in the writeup on that vendor.

EXHIBIT III-17

GROUP A (LOSSES)
USERS' COMMUNICATION PROTOCOLS

PRIMARY
- TCP/IP (6)
- Ethernet (5)
- DECnet (3)
- SNA (2)

SECONDARY (One Mention Each)

HyperChannel; AppleTalk; NJE; ISO; ARPANET; NASA SPANnet; X.25; UDP/IP; Async.; SITnet; NSFnet; CSnet.

Since Cray has the largest installed base, it follows that desired communication protocols match Cray product offerings.

Since these machines are used in scientific/technical environments, the high proportion of Ethernet and DECnet protocols is not surprising.

IV

Research Findings Group A (Losses) Western Europe

IV

Research Findings Group A (Losses) Western Europe

A

Demographic Information

Amdahl supplied INPUT with the names of companies to contact in Western Europe.

INPUT Western European survey demographics among the seven accounts where Amdahl was not successful are:
- three Educational or Research Institutions
- three Discrete Manufacturers
- one Government Agency

Within the seven Western European companies, INPUT researchers identified a total of seven installed supercomputers.

- The Cray X/MP line was the most frequently installed system, with four installations.

- One of each of the following systems was also installed or on order: IBM 3090 VF; ETA 10 (on order); Siemens (who resells the Fujitsu Vector Processors).

European installed supercomputers share data mainly with IBM mainframes and to a much lesser extent, with DEC VAX and Siemens (although not those manufactured by Fujitsu) computers. Supercomputers in European companies did not share data with either minisupercomputers or engineeringworkstations. Please refer to Exhibit IV-1.

EXHIBIT IV-1

GROUP A (LOSSES)
WESTERN EUROPEAN
DEMOGRAPHIC INFORMATION

- 7 organizations; 7 installed supercomputers
- Cray X/MP is most popular model
- Installations of IBM 3090 VF
- ETA 10 On Order
- Supercomputers Share Data Mainly With IBM 30XX Mainframes
- Supercomputers are Not Sharing Data with Engineering Workstations or Minisupercomputers

B

Purchase Decision

Vendors Considered

Respondents at least considered virtually every supercomputer vendor before selecting finalists. In addition to Amdahl, Cray, and IBM, users considered the following vendors: NAS (Resells Hitachi systems); Control Data Corporation; Siemens; and ETA Systems.

While based on a very limited sample, Amdahl, ETA, IBM and Cray were selected as finalists in every instance where they were initially considered.

- Siemens, who also resells Fujitsu supercomputers, was selected as a finalist in 50% of the cases where it was initially considered.

- CDC also made it to the finalist stage in 50% of the instances where it was first considered.

EXHIBIT IV-2

GROUP A (LOSSES - W. EUROPE) PURCHASE DECISION

- Length of Cycle
  - Range: 6 - 18 months
  - Mean: 11.5 months
  - Median: 9 months
  - Mode: 9 months
- System Target Price
  - Range: $5.5 - $11.2 million
  - Mean: $8.5 million
  - Median: $10 million
  - Mode: None
- Was Price Negotiated?
  - Yes (4)

In general, the European decision cycle took longer than the U.S. decision cycle — 6 to 18 months with a mean of 11.5 months.

Organizations expected to spend in the neighborhood of $5.5 - $11 million for their supercomputer systems, slightly more than U.S. budgets. The difference can be attributed to differences in currency exchange rates.

Negotiation is part of the European's way of doing business and is reflected in the 4:1 ratio of organizations who negotiated the price versus those who did not.

EXHIBIT IV-3

GROUP A
(LOSSES - WESTERN EUROPE)
"TOP 3" PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	
Price	2
Good vectorization software (Both purchased Cray X/MP)	2
State-of-the-Art Technology	2
Available Application Software	2
SECONDARY	
Processing Speed	1
Performance	1
PriCe/Performance	1
CPU Capacity	1
IBM Compatibility	1
Cray Compatibility	1
Stable Product	1
Reliability	1

EXHIBIT IV-4

GROUP A (LOSSES - WESTERN EUROPE) "OTHER" IMPORTANT PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	3
Price	3
Hardware Maintenance	2
Software Maintenance	2
SECONDARY	3
Confidence in the Vendor's Survivability	1
Communicate with DEC and IBM Computers	1
Operating Costs	1

INPUT asked qualified respondents an open ended question to identify the "top three" purchase decision criteria used before buying their organization's supercomputer.

One of the three primary criteria – good vectorization software – is surprisingly specific reflecting a great amount of pre-proposal work by European firms.

Note too that, unlike the U.S. market, "price" ranks as a primary purchase criterion, reflecting European's price-consciousness or emphasis on value.

EXHIBIT IV-5

GROUP A
(LOSSES - WESTERN EUROPE)
CHANGES IN DECISION CRITERIA

No: 6

Yes: 1

Specific Change

- Having IBM computers installed forced emphasis on IBM compatibility and low price (Philips)

Decision criteria remained stable in the Western European market. Only one of seven respondents indicated a change in purchase decision criteria.

The change may not have really been a change – rather an initial requirement. In this instance, a combination of tight budgets and installed IBM computers mandated the selection of an IBM-compatible supercomputer.

EXHIBIT IV-6

GROUP A
(LOSSES - WESTERN EUROPE)
ATTITUDE TOWARDS JAPANESE MANUFACTURED CPU

(N = 4)

Negative Effect: 1 (Philips)

No Effect/Minimal Effect: 3

Overall, the Europeans are less concerned than U.S.companies that a CPU is manufactured by a Japanese company.

Only one company, N.V. Phillips of the Netherlands, views this situation negatively. Philips sees the Japanese as competitors and, for that reason, will not buy from them.

EXHIBIT IV-7

GROUP A
(LOSSES - WESTERN EUROPE)
IMPORTANCE OF PURCHASE PRICE VS. OPERATING COST

PURCHASE PRICE (Respondents = 6)

- Very Important: 50%
- Important: 33%
- Unimportant: 17%

USER COMMENTS: PURCHASE PRICE

- Uses price/performance ratio as evaluator of best system (3 mentions)
- Budget constraints (3 mentions)
- Lower price allowed purchase, rather than rental (1 mention)

OPERATING COST (Respondents = 6)

- Very Important: 0%
- Important: 17%
- Unimportant: 83%

USER COMMENTS: OPERATING COST

- Represents a small amount in comparison to purchase price (2 mentions)

Western Europe differs from the U.S. in the importance of the operating cost in buying a supercomputer.

- 83% of respondents consider the purchase price "very important" or "important" in the buy decision, similarto the 75% of U.S. respondents.
- As a result of exchange rates and the cost of service,the European market appears more price-conscious than the U.S. Frequent mentions include "tight budgets" and"price/performance considerations," another way of stating price-consciousness, rather than performance or capability.
- Operating costs were considered "unimportant" by 83% of our limited sample. However, the reasons make sense – operating costs are similar for supercomputers, implying that if an organization can afford to buy one, it can afford to pay the upkeep on one.

Same Supplier

Among European accounts where Amdahl lost, all six vendors agreed that dealing with one vendor would be good.However, two users stated it would not be possible.

Use of Benchmarks in Purchase Decision

All six respondents indicated that benchmarks were required as part of the purchase decision. Only three respondents were willing to discuss benchmark results.

- One stated that Cray ran fastest with Amdahl second and IBM in third place.
- Another said Cray came in second place, but would not identify the winner.
- The third respondent indicated that all were very similar and selected a Cray although Cray came in second in benchmarks.

Sales Process

Of three responses, two installations indicated Cray best handled the process and 1 felt IBM did the best job. Two respondents believed all were good: Cray and IBM in one account; Cray, CDC and Siemens in the other account.

NOTE: All four sites where Amdahl installed supercomputers indicated that Amdahl best handled the sales process.

NOTE: All European sites with Cray and IBM supercomputers installed identified Cray and IBM, respectively, as the vendor who best handled the sales process.

The European respondents did not provide detailed information about what makes for a successful sales process.

C

Future Needs and Directions

European user needs can be summarized in only one word — "bigger."

- Users want one key item: a larger main memory. Europeans emphasize capacity, not speed, and capacity is the key to capability.
- Price/performance isn't mentioned at all in Europe compared to three mentions in the U.S.

Four of seven reporting sites do not plan to purchase additional supercomputers within the next year.

EXHIBIT IV-8

GROUP A (LOSSES - WESTERN EUROPE) FUTURE USER NEEDS

Criterion	Number of Respondents
PRIMARY	
More Capacity/Larger Main Memory	3
SECONDARY	
Interactive Graphic Software	1
Multiprocessing	1
More Vector Processing Capability	1
Better Overall Performance	1
More Reliable	1
High Speed Front End Channel	1

EXHIBIT IV-9

GROUP A (LOSSES - WESTERN EUROPE) 1 - 2 YEAR PURCHASE/UPGRADE PLANS

- Will Purchase Additional Supercomputer?
  - Yes: 2
  - No: 4
  - No Response: 1
- Do you Plan to Upgrade Your System?
  - Yes: 3
  - No: 2
  - No Response/Not Asked: 2
- Most Mentioned System Upgrades
  - More Disk Storage ("Backup Memory") 1

However, three of five sites reporting indicate they will upgrade their CPUs within the next year or two.

- The lone respondent indicated they would increase the amount of disk storage.

D

Vendor-Related Information

Introduction

INPUT and Amdahl agreed to ask respondents' opinions about the following vendors (listed alphabetically):

- Amdahl
- Cray
- ETA
- IBM
- NEC
- Others

The following information is presented for each vendor listed above:

- Overall Opinion
- Strengths
- Weaknesses
- Sales Process (Amdahl and Cray only)
- Benchmarks
- Meet/Did Not Meet Customers' Expectations (Cray and IBM only)

Specific comments on the sales process follow discussion of each vendor.

Please recall that this is a limited sample. Furthermore, many Europeans were reluctant to provide specific comments on vendors since their supercomputers were purchased through competitive bidding procedures.

EXHIBIT IV-10

GROUP A (LOSSES - WESTERN EUROPE) USER COMMENTS: AMDAHL CORPORATION

OVERALL
- Company is not well-known (2)
- Low installed base
- Good vectorization software

STRENGTHS
- Reliability (2)
- IBM compatibility (1)
- Ease of use (1)
- Flexible pricing (1)
- Advanced technology (1)
- Low operating cost (1)

WEAKNESSES (One mention each)
- Limited application software
- Lack of multiprocessing capability
- Small company
- Does not manufacture the system
- Cannot provide same level of support as Cray
- Has too little experience and know-how

SALES PROCESS
- "All vendors were good and professional; no difference between them" (Deutsche Wetterndienst)

BENCHMARKS
- No commercial software available
- Generally very good; nothing bad

Amdahl is either: not well known in supercomputers (2), has few installations (2), or has positive comments about its vectorization software (1).

- Major strengths include: reliability (2); IBM compatibility (1); ease of use (1); flexible pricing (1); advanced technology (1); and low operating cost (1).

- Respondents identified six weaknesses: limited application software; lack of multiprocessing capability; small company; does not manufacture the system; cannot provide same level of support as Cray; too little experience and know-how.

- Among lost accounts, one account indicated a lack of available application software (Peugeot/Citroen). Otherwise, benchmarks ran reasonably well.

The user statement which best summarizes Europe's attitude toward Cray is: "Cray is well implanted in the scientific community; they relate well to supercomputer gurus."

Similar to the U.S., Europeans view Cray as the technology leader for reasons unrelated directly to technology!

- Large installed base (4)
- First to market (1)
- Other firms are building in Cray compatibility (1)

In Western Europe, Cray's strengths center around its large installed base. The vendor's stability represents a key purchase decision factor, representing Europeans' general aversion to risk.

- The Cray X/MP is a strong product — it is well- designed, with balanced performance, and lives up to claims made in the product brochure.

Of the three weaknesses mentioned in the exhibit, two are oriented to the company and one is product-specific. Company comments indicate some Europeans still view Cray as small (and comparatively risky) and expensive; the product comments highlight "knockoffs."

EXHIBIT IV-11

GROUP A (LOSSES - WESTERN EUROPE)
USER COMMENTS: CRAY

OVERALL
- Market leaders (5)
- Most installations (4)

STRENGTHS
- Good marketing (2)
- Market focus (1)
- Wide selection of application software (1)
- X/MP is well designed with balanced performance (1)

WEAKNESSES
- Small company with limited R&D resources (compared to IBM) (2)
- Expensive and inflexible on pricing (2)
- Cray-2 is unbalanced; FORTRAN compiler is not well designed (1)

SALES PROCESS
- Two of three respondents to question indicated Cray best handled the sales process

BENCHMARKS
- Good overall performance (1)

SURPASSED USER EXPECTATIONS
- Speed (1)

DID NOT MEET USER EXPECTATIONS
Vectorization of some software (1)
- Hardware reliability a bit worse than expected (1)
- Parallel processing not as easy to use as expected (1)

EXHIBIT IV-12

GROUP A
(LOSSES - WESTERN EUROPE)
USER COMMENTS: ETA SYSTEMS

OVERALL

- Very powerful system on paper (2); but, they made a heavy investment in marketing without a product to sell (1)
- Good for weather forecasting
- Part of CDC

STRENGTHS

- Innovation (2)
- Powerful system (1)
- Economical (1)
- Capacity (1)

WEAKNESSES

- Few installations (2)
- Systems software (1)

BENCHMARKS

- No specific information available

In Europe, ETA appears to be in a double bind — they must pre-sell the system in order to build an installed base but are criticized for aggressively marketing the system before it is released. ETA must fulfill the image of providing a high-performance system to get initial reference account installations and a separate identity from CDC.

The product appears to be better suited to certain niche applications such as weather forecasting, indicating that the supercomputer market has matured sufficiently to identify specific computing niches.

Under strengths, one respondent mentioned "economical" — not an expected response for a system yet to be introduced. Someone did a great job pre-selling the ETA 10's operating efficiencies.

ETA's major weakness — operating system software — is also noted in Europe, proving that it is difficult to change historical perceptions.

EXHIBIT IV-13

GROUP A (LOSSES - WESTERN EUROPE)
USER COMMENTS: IBM

OVERALL
- Not a supercomputer vendor (3)
- Marginal business to IBM; not part of its main strategy (1)
- Good to have a vector processor coupled to a general-purpose computer because speed of front end computer will become more important (1)

STRENGTHS
- Dominant market position (1)
- Offers intermediate computing solution (1)

WEAKNESSES
- 3090 VF lacks sufficient power (1)
- IBM is too new to this market (1)

BENCHMARKS
- No information available

SYSTEM EXCEEDED USER EXPECTATIONS
- Reliability
- Number of jobs processed
- Vectorizing FORTRAN compiler far exceeded expectations and the performance of IBM's regular FORTRAN compiler

Like the American market, European users believe IBM is not in the high end of the supercomputer business. However, Europeans recognize that IBM targets the much broader low end of the supercomputer market with a relatively inexpensive add-on 3090 turbocharger (VF). Users believe this approach is viable since the machine offers good scalar/vector performance.

One respondent indicated that IBM offers an intermediate performance computing solution which, by definition, would not appeal to users wanting top-end performance.

Based on user comments, IBM's new vectorizing FORTRAN compiler provides solid performance improvements for its 3090-based systems. Further proof that software drives hardware, not the other way around.

EXHIBIT IV-14

GROUP A (LOSSES - WESTERN EUROPE)
USER COMMENTS: NEC CORPORATION

OVERALL

- One doesn't hear much of them in Europe (3)
- Looks very interesting; operating system is a bit exotic (1)

STRENGTHS

- Good technology (1)

WEAKNESSES

- European sales and marketing (1)

BENCHMARKS

- No information available

Similar to the U.S., marketing is seen as a definite weakness; the perception of advanced hardware technology is a definite strength.

Sales Process

Of three respondents, one reported twenty contacts per month; another reported only two per month; and the third reported ten total contacts despite a request for minimum contact.

Many of the supercomputers sold in Western Europe were sold to state or national government agencies. As a result, procurement rules define the amount and nature of contact between vendors and buyers.

Respondents reported limited contact with supercomputer vendor executives. However, contact by technical staff members remains extremely important in the process.

EXHIBIT IV-15

GROUP A (LOSSES - WESTERN EUROPE) BENCHMARKS

- 6 of 6 Respondent Organizations Required Benchmarks

- Fastest Benchmarks:
  - 1st Place: Cray/Amdahl (tie)
  - 2nd Place: Amdahl/Cray (tie)
  - 3rd Place: IBM

- Best Job in Benchmarking: Cray

- Reasons for Successful Benchmarking:
  - "Everything was readily available." (Cray)

- Benchmark Criteria
  - Combination of Throughput and Current Job Performance (2)
  - Combination of Current and Future Job Performance (1)
  - Single Job Performance (1)
  - Anticipated Job Performance (1)

Six of six organizations required benchmarks. INPUT believes this accurately reflects the cautious buying nature of Europeans and the need to meet established government guidelines.

The comments in this section are based on three responses. Cray, Amdahl, and IBM systems turned in the best benchmark results. According to only one respondent, Cray was best at the benchmarking process since they had everything readily available.

Benchmark criteria are closely allied with the user's application.

- The weather bureau cared only about single job performance — weather forecasting.
- Peugeot and C.E.R.N. benchmarks measured a combination of through put and current job performance (both bought Cray X/MPs).
- I.A.B.G., a West German defense contractor, considered current and projected job performance (and purchased a Fujitsu system marketed by Siemens).

Comments about specific vendors' benchmarks were included in the writeup on that vendor.

EXHIBIT IV-16

GROUP A (LOSSES - WESTERN EUROPE) USERS' COMMUNICATION PROTOCOLS

Protocol	Number of Respondents
PRIMARY	
TCP/IP	2
SNA	2
SECONDARY	
DECnet	1
EFTAM	1
ISO/Class IV	1

Communication protocols reflect the installed base of supercomputers and front-end computer systems.

TCP/IP is a government/scientific/technical computing standard; SNA is the communications standard in business applications and IBM and plug-compatible mainframes.

V

Research Findings Group B (Wins) Western Europe

V

Research Findings Group B (Wins) Western Europe

A

Demographic Information

Amdahl supplied INPUT with the names of five companies where it installed a supercomputer. INPUT successfully interviewed four accounts.

INPUT Western European survey demographics among the four accounts where Amdahl was successful are:
- One Educational or Research Institution
- Three Oil Exploration Firms or Processing Services for the Oil Exploration Industry

European-based supercomputers would be expected to share data with a limited number of systems. According to Exhibit V-1, INPUT identified two respondents' systems sharing data with IBM; one respondent system shares data with IBM and DEC VAX; and one respondent's systems did not share data with other computers.

This section will discuss qualitative rather than quantitative issues.

EXHIBIT V-1

GROUP B (WINS)
WESTERN EUROPEAN
DEMOGRAPHIC INFORMATION

- 4 organizations; 4 installed Amdahl supercomputers
- Supercomputers Share Data Mainly With IBM Mainframes and DEC VAX Superminicomputers

B

Purchase Decision

Vendors Considered

Respondents considered virtually every major supercomputer vendor before selecting finalists. This sample of users considered Amdahl, Control Data Corporation, Cray, and IBM.

Respondents gave two primary reasons why Amdahl made the list of finalists: (These responses were from different installations.)

- IBM compatibility
- Price

Price Negotiation

All three respondents (one did not respond) indicated the price was negotiated, matching the impression in the U.S. of Amdahl's flexibility.

EXHIBIT V-2

GROUP B (WINS) "TOP 3" PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	
Good vectorization software	2
Performance	2
Price	2
IBM Compatibility	2
SECONDARY	
CPU Capacity	1

INPUT asked qualified respondents an open ended question to identify the "top three" purchase decision criteria used before buying their organization's supercomputer.

One of the three primary criteria – good vectorization software – is surprisingly specific, which reflects a great amount of pre-proposal work by European firms.

Note too that, unlike the U.S. market, "price" ranks as a primary purchase criteria, reflecting Europe's price consciousness or emphasis on value.

EXHIBIT V-3

GROUP B (WINS) "OTHER" IMPORTANT PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	
Reliability	3
- System	
- Hardware	
- Software	
SECONDARY	
Hardware Maintenance	2
Software Maintenance	2
TERTIARY	
Availability of Application Software	1

Reliability and maintenance are relatively important considerations in the supercomputer purchase decision.

The response "availability of application software" indicates a movement away from in-house developed solutions to standard products, thus reinforcing the business aspects of the supercomputer purchase decision.

Changes to Decision Criteria

Decision criteria remained stable in three of four Amdahl- won accounts in Western Europe.

The change was really a recognition that the customer could, in fact, get IBM compatibility. Once discovered, this was made a priority criterion that Amdahl capitalized on.

EXHIBIT V-4

GROUP B (WINS)
ATTITUDE TOWARDS
JAPANESE-MANUFACTURED CPU

(Respondents = 4)

Negative Effect: None

No Effect/Minimal Effect: 3

Overall, the Europeans are not only less concerned than U.S. companies that a CPU is manufactured by a Japanese company, but one respondent associates Japan with a high quality product.

For purchasers of Amdahl supercomputers, purchase price is much more important than operating cost considerations.

Respondents said that operating costs either represent a small portion of overall costs or are similar for all supercomputers.

Same Supplier

Among European accounts where Amdahl won, three of four respondents agreed that dealing with one vendor would be good.

However, one user stated it would make them too dependent on one supplier.

EXHIBIT V-5

GROUP B (WINS)
IMPORTANCE OF PURCHASE PRICE VS. OPERATING COST

PURCHASE PRICE	(N=4)
- Very Important:	75%
- Important:	25%
- Not Important:	0%

USER COMMENTS: PURCHASE PRICE

- Price was important relative to performance
- Uses price/performance and useful life of machine to compute total cost of ownership

OPERATING COST	(N=4)
- Very Important:	25%
- Important:	0%
- Unimportant:	75%

USER COMMENTS: OPERATING COST

- A small amount by comparison (2)
- Same for all supercomputers (2)

Use of Benchmarks in Purchase Decision

All four accounts indicated that benchmarks were required as part of the purchase decision.

One of the four ran the benchmarks one year earlier and chose not to re-run them.

Sales Process

All four sites where Amdahl installed supercomputers indicated that Amdahl best handled the sales process.

C

Future Needs and Directions

Amdahl customers have specific needs oriented exclusively toward hardware.

- More capacity/larger main memory is a logical request, given that other large users want more main memory to handle larger problems.
- Improved vector and improved scalar performance was requested by GECO Norway and GECO UK, respectively.
- Ease of access (presumably telecom network access) and a wider network were logically requested by UNI-C, an educational/research consortium in Denmark. Educational institutions tend to want access to a variety of educational computing networks.

EXHIBIT V-6

GROUP B (WINS)
FUTURE USER NEEDS

NOTE: All responses received one mention each

- More balanced system (faster channels and peripherals)
- Faster scalar unit
- More vector processing capability
- Parallel processing
- More capacity/larger main memory
- Ease of access
- Wider network

1-2 Year Purchase/Upgrade Plans

Two of four Amdahl users (GECO UK and GECO Norway) may upgrade their systems within the next two years.

UNI-C plans to upgrade their system in that time frame.

NORSTAR/NORCOMP do not plan to upgrade their systems.

D

Vendor-Related Information

Introduction

INPUT and Amdahl agreed to ask respondents' opinions about the following vendors (listed alphabetically):
- Amdahl
- Cray
- ETA
- IBM
- NEC
- Others

The following information is presented for each vendor listed above:
- Overall Opinion
- Strengths
- Weaknesses
- Sales Process (Amdahl and Cray only)
- Benchmarks
- Meet/Did Not Meet Customers' Expectations (Cray and IBM only)

Specific comments on the sales process follow discussion of each vendor.

Please recall that this is based on a very limited sample.

EXHIBIT V-7

GROUP B (WINS)
USER COMMENTS: AMDAHL CORPORATION

OVERALL

- Have had long standing relationship since 1980 (GECO)
- Small company, but very good (GECO - U.K.)
- Very reliable hardware; least expensive equipment; very good sales people (NORSTAR)
- They are lucky they're selling Fujitsu (UNI-C)

STRENGTHS

- Advanced technology (2)
- IBM compatibility (2)
- Reliability (1)

WEAKNESSES

- Limited Application Software
- Small company
- Does not manufacture the system

SALES PROCESS

- All four accounts believed Amdahl best handled the sales process.
- Comments: Most responsive; most cooperative; most interested in making a sale and put more effort into it; flexible and could quickly answer any technical question.

BENCHMARKS

- All three respondents indicated Amdahl did the best job in the benchmarking process.
- Comments: "Generally very good; nothing bad; performed as promised."

Amdahl users are satisfied! Comments were far more positive than negative.

- The positives indicate that Amdahl worked hard for these accounts – the customers recognized that. The product is reliable and was least expensive for this application.

- The major negative comments concerned the lack of (third-party) application software and Europeans' view that Amdahl is a small company, compared to IBM, Olivetti, Siemens, etc.

EXHIBIT V-8

GROUP B (WINS)
USER COMMENTS: CRAY

OVERALL
- Good company
- Leading supercomputer vendor
- Large installed base
- Market leader; inflexible

STRENGTHS
- Speed (2)
- Market Leadership (2)
- Amount of main memory (1)

WEAKNESSES
- Inflexibility (2)
- Non IBM Compatible (1)
- Reliability (1)

Even among Amdahl accounts, Cray is the acknowledged market leader. Two key plusses noted by Amdahl's lost accounts – large installed base and a good company – were repeated.

Two noted weaknesses – inflexibility and poor reliability – while consistent with others' comments, cannot necessarily be capitalized on by Amdahl. The third weakness – lack of IBM compatibility – can be attacked directly by Amdahl.

EXHIBIT V-9

GROUP B (WINS)
USER COMMENTS: ETA SYSTEMS

OVERALL
- Looks very interesting on paper (2)
- Too new (1)
- Don't know them (1)

STRENGTHS
- Innovation (1)
- Powerful system (1)

WEAKNESSES
- Systems software (1)

To join the supercomputer fraternity, ETA must deliver systems.

The systems, while acknowledged as powerful, are believed to have poor system software by Amdahl's supercomputer customers.

EXHIBIT V-10

GROUP B (WINS)
USER COMMENTS: IBM

OVERALL
- Not really in the supercomputer market (2)
- Doesn't really sell a supercomputer; rather, IBM sells add-ons to existing systems (1)
- They're IBM; that speaks for itself (1)

STRENGTHS
- Dominant market position (1)

WEAKNESSES
- Systems not compatible with more powerful systems (1)
- Insufficient vector processing capability (1)
- Lack of interest in this market (1)

BENCHMARKS
- It was difficult to get into the system since the company was so security conscious. (1)
- Among this group of respondents, IBM benchmarks came in second at one location. (1)

Like others, Amdahl users believe IBM is not committed to the high-end supercomputer market.

Two specific weaknesses mentioned are:
- The lack of vector processing power in IBM's 3090 series products; and the lack of software compatibility with Cray computers.

EXHIBIT V-11

GROUP B (WINS)
USER COMMENTS: NEC CORPORATION

OVERALL
- One doesn't hear much of them in Europe (2)

STRENGTHS
- Good technology (1)

WEAKNESSES
- European sales and marketing (1)

BENCHMARKS
- No information available

Although NEC has a powerful system, the company is not well-known in Europe.

Sales Process

All four accounts where Amdahl installed its supercomputers stated that Amdahl best handled the sales process. Amdahl was:
- More responsive.
- Most cooperative; benchmarking was easy.
- Most interested in making a sale and put more effort into it.
- Flexible and could quickly answer any technical question.

EXHIBIT V-12

GROUP B (WINS)
BENCHMARKS

- Three of four Respondent Organizations Required Benchmarks The fourth organization ran benchmarks one year before.

- Fastest Benchmarks: (NOTE: Based on only 1 respondent)
  - 1st Place: Amdahl
  - 2nd Place: IBM

- Best Job in Benchmarking: Amdahl (by 3 of 3 respondents)

- Reasons for Successful Benchmarking: (All are quotes)
  - Showed customer how to optimize compiler
  - More co-operative than IBM
  - Amdahl was always providing everything; we had to ask IBM for everything
  - IBM was less forthcoming than Amdahl

- Benchmark Criteria
  - Anticipated Job Performance (2)
  - Throughput (2)

Benchmarks are an important part of the sales process, which is reflected in the comments about Amdahl's successful efforts in the benchmark process.

In short, Amdahl's European operations "out-IBMed IBM" – they were more forthcoming with information and provided good technical information in a timely manner.

Communication Protocols

All Amdahl installations reported the need for SNA or "all IBM protocols," a response one would expect in view of IBM compatibility.

VI

Research Findings Group C (Prospects) United States

VI

Research Findings Group C (Prospects) United States

A

Demographic Information

Amdahl supplied INPUT with the names of twelve target prospect companies and three industries from which to find prospects.

INPUT contacted ten firms. Survey demographics among the ten U.S. prospects are:

- Three Educational or Research Institution
- Three Pharmaceutical Manufacturers
- Two Aerospace Manufacturers
- One Airline
- One Financial Services Organization

EXHIBIT VI-1

GROUP C (PROSPECTS)
INTRODUCTION

- Ten Organizations
- Supercomputers Would Share Data Mainly With IBM Mainframes and DEC VAX Superminicomputers
- Supercomputers Would Also Share Data With Minisupercomputers

According to Exhibit VI-1, supercomputers installed at prospect companies would be expected to share data primarily with DEC VAX superminis and IBM mainframes.

- Convex minisupercomputers were mentioned twice as machines with which the supercomputer would be expected to share data.
- Other computers mentioned once include Amdahl and CDC mainframes and Alliant minisupercomputers.

B

Purchase Decision

INPUT asked qualified respondents an open ended question to identify the “top three” purchase decision criteria that would most likely be used before buying their organization’s supercomputer.

EXHIBIT VI-2

GROUP C (PROSPECTS)
“TOP 3” PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
PRIMARY	
Solve problems	2
Cost effective	2
Speed/power	2
SECONDARY	
Use a general purpose architecture	1
Select the supercomputer most desired by users	1
Price/performance	1
Service and support	1
Compatibility with DEC VAX FORTRAN compiler	1
Ease of software conversion	1

Respondents are looking for cost effective problem solving. INPUT emphasizes "cost effective" since business considerations have a greater role in these purchase decisions.

Noteworthy comments include remarks on general purpose architectures and specific application or system software requirements. These comments indicate the supercomputer market is forming segments, one of which may be distinguished by the mainframe of supermini from which customers upgrade.

EXHIBIT VI-3

GROUP C (PROSPECTS) "OTHER" IMPORTANT PURCHASE DECISION CRITERIA

Criterion	Number of Respondents
Compatibility with Installed Cray	1
Vendor Commitment to UNIX	1

The response "Compatibility with an installed Cray" verifies that once the first system is installed, the user is pretty well locked-in to one vendor.

On the other hand, users who don't want to be locked in to a single vendor opt for the UNIX operating system, thus raising a different problem. The user want to know: "How committed is that vendor to supporting UNIX?"

EXHIBIT VI-4

GROUP C (PROSPECTS) ATTITUDE TOWARDS JAPANESE-MANUFACTURED CPU

(N = 5)

Negative Effect: 2

No Effect/Minimal Effect: 3

Positive Effect: None

Of the prospects surveyed, attitudes toward Japanese manufactured systems tended to be either neutral or negative. More respondents were neutral than negative. Specific negative responses included:

- Local management (rather than a corporate policy) decision
- Harder to sell their supercomputer center proposal to the U.S. government if they were to use a Japanese CPU

EXHIBIT VI-5

GROUP C (PROSPECTS) IMPORTANCE OF PURCHASE PRICE VS. OPERATING COST

PURCHASE PRICE (N=7)

- Very Important: 43%
- Important: 43%
- Unimportant: 14%

USER COMMENTS: PURCHASE PRICE

- Purchase price is key component of price/performance calculation (2)
- Uses 5-year cost of ownership calculation
- Timing of purchase is more important (defense contractor)
- Everything must be justified

OPERATING COST (N=6)

- Very Important: 17%
- Important: 17%
- Unimportant: 66%

USER COMMENTS: OPERATING COST

- Operating costs don't come out of their budget (2)
- All supercomputers have similar operating costs
- Tax laws for partnerships favor high purchase price and low operating costs

For this group of prospects, purchase price is more important than operating cost in the supercomputer purchase decision. Eighty-six percent of respondents indicated purchase price is important or very important, compared to thirty-four percent for the importance of operating cost.

Important implications for Amdahl include:

- Checking by the salesman during the sales process to learn which department actually pays operating costs

- Sales resps should have full five-year cost of ownership data for Amdahl and competitors' systems

Same Supplier for Mainframes and Supercomputers

Of five respondents to this question, four indicated that having one supplier for mainframes and supercomputers would be beneficial.

- Three cited a key advantage of dealing with less vendors for service and support.

- One indicated that it would be beneficial, provided that the vendor was not one selling Japanese-made equipment.

EXHIBIT VI-6

GROUP C (PROSPECTS) DESIRED APPLICATION & UTILITY SOFTWARE IN PURCHASE DECISION

Application Software

- ANSYS (2); NASTRAN (2); PARTRAN; STARDYNE (Structural analysis)
- SYBIL and others (2) (Molecular modelling)
- Computational Fluid Dynamics
- Quantum Chemistry
- Physics
- Astronomy
- Atmospheric Sciences

Utility Software

- High quality (vectorizing - 1) FORTRAN compilers (3)
- IMSL
- Linear programming models
- Matrix mathematics routines & subroutines
- Math/statistical subroutines
- Profilers to allow optimum use of hardware

Responses basically paralleled the industries surveyed – aircraft manufacturers need structural analysis; pharmaceutical manufacturers want molecular modelling software; investment banking houses want matrix math and linear programming software.

Clearly, there is no generic solution. Vendors must understand industry requirements and systems must run specific applications to meet the needs of a particular industry.

C

Future Needs and Directions

Prospects want more capacity and a larger main memory, a request similar to that of current supercomputer users. Certain prospects also want compatible compilers that do better vectorizing, a clear recognition of the performance advantages to be gained through improved software.

EXHIBIT VI-7

GROUP C (PROSPECTS)
FUTURE USER NEEDS

Criterion	Number of Respondents
PRIMARY	
More capacity/Larger main memory	2
Compatible compilers that do better vectorizing	2
SECONDARY	(1 response each)
Speed	
Better scalar performance	
More balanced (scalar/vector) performance	
Faster I/O	
More reliable	
Less expensive, physically smaller, more reliable disks	
More cost effective	

Secondary responses are important, too.

- Better scalar performance and more balanced performance indicate a growing awareness of the need for strong scalar performance to effectively handle those applications which cannot be highly vectorized.
- Faster I/O recognizes one potential system bottleneck.
- Users and potential users want better system reliability, as a result of rumors and stories about variable system uptime.

D

Vendor-Related Information

Introduction

INPUT asked for prospects' overall opinion about these vendors (listed alphabetically):

- Amdahl
- Cray
- ETA
- IBM
- NEC

While INPUT obtained good qualitative information, please recall that this section is based on a very limited sample size.

EXHIBIT VI-8

GROUP C (PROSPECTS) COMMENTS: AMDAHL CORPORATION

OVERALL

- Don't know much about them (3)
- IBM look-alike; but behind IBM in technology and offset by a lower price (1)
- Impressive, but needs more scientific/technical application software (1)
- Concerned about portability of application software in IBM and DEC software environments

Amdahl is: not well known in the supercomputer domain (3); seen as an IBM look-alike (2) (one replied "a technologically inferior look-alike); and has received one positive comment about its mainframes as a UNIX engine.

With the good comments about IBM compatibility comes one key negative – the lack of third-party application software for scientific/technical computing environments.

Unfortunately, AT&T, which responded positively about Amdahl mainframes as a UNIX engine, also commented that the systems operate best only in easy-to-vectorize applications.

Whether true or not, one is led to believe that the system architecture is oriented toward heavily vectorized applications. For whatever reason, customers must be proficient in "tuning" the application software to gain real performance advantages.

EXHIBIT VI-9

GROUP C (PROSPECTS) COMMENTS: CRAY

OVERALL

- Solid company; the leader (5)
- Good to work with (1)
- Question: What is the effect on future products of Steve Chen's departure? (1)
- Fast; not cost effective (1)

Cray is perceived as the clear market leader, and as a good company to work with.

However, we received two key negative comments:

- Prospects and current users may be worried about the effect of Steve Chen's departure on future products. Comments by Cray users (in other sections of this report) indicate that people perceive Cray as the technology leader based primarily on future products. Salesmen's promises may now be harder to keep.

- While Cray systems may be fast, one person (at McDonnell Douglas Aircraft) said that they are not cost-effective. More people are carefully scrutinizing the financial aspects of the purchase decision.

EXHIBIT VI-10

GROUP C (PROSPECTS) COMMENTS: ETA SYSTEMS

OVERALL

- Must prove itself (4)
- Poor quality/lack of operating system (2)
- Satisfied with the speed of the system (1)

Overall, prospects believe ETA Systems has its work cut out. However, the system is powerful.

The negative comment is a significant one. The poor quality operating system (based on that used in the CDC CYBER 205) will, in fact, lose sales to universities and some institutions which do not like the CYBER 205 architecture.

EXHIBIT VI-11

GROUP C (PROSPECTS) COMMENTS: IBM

OVERALL

- Not really in the supercomputer market (4)
- Expensive and fast, although not as fast as Cray or ETA (1)
- No technological edge, although respondent is oriented toward IBM due to software compatibility (1)
- Despite its professed commitment to scientific/technical computing, most of IBM's R&D spending is in commercial environments. (1)

Overall, prospects:

- do not consider IBM in the high end of the supercomputer market along with Cray, ETA, Amdahl, and others
- are skeptical of IBM's professed commitment to scientific/technical computing.

Most prospects have not heard of NEC in the supercomputer market. One respondent indicated that NEC has powerful hardware.

EXHIBIT VI-12

GROUP C (PROSPECTS) COMMENTS: NEC CORPORATION

OVERALL

- Don't know much about them (6)
- Powerful machines (1)

EXHIBIT VI-13

GROUP C (PROSPECTS)
COMMUNICATION PROTOCOLS

Criterion	Number of Respondents
SNA	1
DECnet	1
Possibly DECnet	1
DataKit	1
National Laboratories' Protocol (TCP/IP?)	1
TCP/IP	1

Prospects use a mix of protocols, with no dominant protocol.

A

Appendix: United States Responses (Losses)–Tabulation

A

Appendix: U.S. Responses (Losses)–Tabulation

Introduction

As part of this project, INPUT provides a complete tabulation of responses. The following guidelines will enable the reader to fully utilize the information contained in the body of the Appendix.

- The numbers at the beginning of each tabulation correspond to the number of the question in the original questionnaire.
- The number of responses within each category is shown in parentheses.
- Every effort has been made to capture the gist of each respondent's comments. For questions of a qualitative nature, quotes are provided, although quotation marks are not shown.

INPUT normally conducts its interviews on a confidential basis. Respondents to this interview process were not told that their responses would be kept confidential. However, Amdahl should use discretion in using results where the respondent can be identified or is specifically identified.

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1. WHICH SUPERCOMPUTER(S) DO YOU HAVE INSTALLED?

Cray 1 - 4
Cray X/MP - 6
IBM 3090 VF - 3
"Various Crays" - 1
Cray-2 - 1
3 FPS 264 & 1 Tesseract T-20 (Inmos transputer) - 1

2. D. DO YOU PLAN TO PURCHASE A MINISUPERCOMPUTER?

Yes	5
No	7

2. E. WHY (DO YOU PLAN TO PURCHASE/NOT PURCHASE A MINISUPERCOMPUTER)?

Strong price/performance - 1
"Wave of the future" - 1
Use for graphics-based application development - 1
Provides (BCS) Tier 2 computing power - 1
Better at some technical applications than supercomputer - 1
Replace aging mainframe - 1
No — just purchased Cray X/MP-24
No — Cray offers plenty of power
No — large machines are best for their applications. - 1
No — would have required conversion to UNIX
No — does not fit their business plan
No — has an Alliant installed

3. WITH OTHER MANUFACTURERS' COMPUTERS DOES YOUR SUPERCOMPUTER COMMUNICATE?

IBM 3090 - 3
DEC VAX - 6
IBM 308X/303X - 3
DG Eclipse - 3
Daisy - 1
CDC Cyber - 1
Alliant - 1
Concurrent - 1
Amdahl - 1
Sun - 2
Apollo - 1
Apple - 1
Silicon Graphics - 1
CadNetix - 1
Other DEC minis - 1
Gould S.E.L. - 1
None - 1 (118)
NAS - 1

7. A. WHAT ARE THE TOP 3 PURCHASE DECISION CRITERIA USED TO JUSTIFY THE PURCHASE OF A SUPERCOMPUTER?

Power/performance/speed - 11
Price/performance - 5
Price - 3
Migration for FORTRAN 77 to UNIX - 1
Application & system software (together) - 1

Support nuclear plant operations - 1
Availability/delivery - 1
Expose staff to newest technology; attract good people - 1
Budget available for supercomputer purchase - 2
Had organization in place to support supercomputer - 1
Compatibility with current/Ind. specific application software - 3
Ability to do LSI/circuit design - 2
Simulate user interface - 1
TCP/IP compatibility - 1
Supports FORTRAN or C Compilers - 1
Support/manpower/overhead - 2
Provide local access for supercomputer users - 2
Allow growth in number of supercomputer users - 1
Ease of installation/upgrade - 4
Interactive graphics operation - 1
IBM compatibility - 1
Worldwide support, especially remote areas - 1 (117)
Proper service capabilities - 1 (117)
Offer timesharing on supers - 1 (118)

7. C. WHAT OTHER PURCHASE DECISION CRITERIA WERE USED WHEN JUSTIFYING THE PURCHASE OF A SUPERCOMPUTER?

Long life for CPU architecture - 1
Reliability - 2
Ability to share application software - 1
Availability of third-party software - 1
Networking capabilities - 1
Already had a Cray (decision was which CPU to buy) - 1
Local maintenance/service - 1
Establish continuing relationship with vendor - 1
Move from separate AP to attached VF processor - 1

8. A. DID THE DECISION CRITERIA CHANGE DURING THE DECISIONMAKING PROCESS?

Yes - 4
No - 13

8. B. IF YES, HOW DID THE CRITERIA CHANGE?

Must serve a broader user community (107)
User interface (Cray - 110)

Operating system (Cray - 110)
Financing priorities changed (118)
Location changed (118)
Difficulty of vectorizing "old" FORTRAN code for technical applications affected their choice of CPU (119)

9. E. WHAT COMMUNICATION PROTOCOLS ARE IMPORTANT TO YOUR SUPERCOMPUTER OPERATION?

Ethernet - 5
HyperChannel - 1
TCP/IP - 6
AppleTalk - 1
NJE - 1
ISO - 1
ARPAnet - 1
NASA SPANet - 1
SNA - 2

DECnet - 3
X.25 - 1
UDP/IP - 1
Async. - 1
IR - 1
Bitnet - 1
NSFNet - 1
CSNet - 1

11. WHAT EFFECT DID NEC/AMDAHL/HITACHI SELLING A JAPANESE-MANUFACTURED MACHINE HAVE ON THE PURCHASE DECISION?

Would NOT have considered buying a Japanese-made machine

- Patriotism - 1
- Buy American under federal law - 1
- Government not buying Japanese CPUs unless they have performance an order of magnitude greater than existing CPUs - 1
- Amdahl not seen as supercomputer in 1984 - 1
- No established track record in US - 1
- Procurement was make & model type. Amdahl didn't qualify anyway. (115)

No/minimal effect

- Would have bought if the benchmark result was the best and since Amdahl Corporation has large US component - 1 (105)
- Considered on technical merits (and organization had some familiarity with Cray) - 1 (107)
- If Amdahl would have won the benchmark competition, then they would have to reconsider attitude. There may be a possible negative attitude since state funds were used and Michigan is a "buy American" state - 1 (108)
- We have Amdahl & NAS mainframe in house; no problem (109 and 111)
- No effect. But Amdahl was not forthcoming on pricing in 1983-84;

machine would cost $20 million (110)

- No effect. We use Japanese components to build CPU (112)
- Absolutely none. No legal restrictions either (114)
- No effect. Recognize Amdahl's modifications to Fujitsu CPU & US-based support & service (116)
- At time of purchase, Japanese governmentt subsidies to own semiconductor companies was topical (117)
- Marketing decision. If Amdahl/NEC computers were most often requested by customers, we would have installed them. (118)
- Have Amdahl & NAS mainframes installed. Semi concern is if seriously broken, then have Japanese repairman speaking directly with Tokyo (119)

12. B. WHAT ARE THE REASONS FOR THAT VENDOR'S PERCEIVED TECHNOLOGY LEADERSHIP?

CRAY
Provide complete solution / builds pure supercomputers - 2
Strong technology - 2
Strong scalar processing - 1
Future products are very impressive - 3
Strong market share / installed base - 3
Cray has the fastest system (Hardware/Systems, Software/Applications Software) - 3
Has best communication interfaces under development - 1
Cray builds a system that works to spec all the time - 1
Balanced machine (I/O & computing) - 1
Good compiler support - 1
UNICOS operation system is good - 1
Most application software - 1

FUJITSU/NEC/HITACHI
Fujitsu circuitry - 1
Good too - 1

FUJITSU
Broadest line of supers - 1
Excellent design - 1
If Fujitsu gave up IBM compatible, then could do better job - 1

NEC
Fastest hardware on the market - 1

THINKING MACHINES CORP
Massively parallel architecture - 1
However, no one has learned how to use it - 1

14. VENDORS — WHAT IS YOUR OVERALL IMPRESSION OF ______ SUPERCOMPUTER VENDOR? WHAT ARE ITS STRENGTHS? WHAT ARE ITS WEAKNESSES?

CRAY

Businesswise, they're conservative; technically, they're very aggressive; they're serious about this business. (101)
Extremely customer-oriented (103)
Very shrewd business people since they have created the image of highest performance and are getting top dollar for their products (105)
Arrogant (106)
Aggressive and technically sound (107)
Need more competition (108)
Good at getting people pregnant with supercomputers (109)
Best vendor out there! (110)
DoD business props them up (111)
Not spending enough on R&D (111)
Poor quality design for CPU (111)
DoD perception is that Cray is ONLY U.S. manufacturer (111)
Currently the leader & plans to stay there (112)
Good company (113) (114)
Know what they're doing; runs fine; smooth process (115)
Want to be known for building fastest, most cost-competitive supers (116
Currently the leader in scientific computing (117)
Market leader; good company (118)
Excellent company; excellent CPU; enjoyed working with them; but too expensive (119)

CRAY — Strengths

Packaging technology - 1
Superior product performance - 1
Communication capabilities - 1
Working technology/engineering/R&D - 5
Products are not released until they work - 1
FORTRAN compiler - 1
Concern with numerical simulation as most important aspect of supercomputing - 1
Good marketing (incl IB) - 5
Bright user community for solving new problems and keeping
Cray on its toes -1
Seductive computing environment - 1
Understands its customers - 1
Focused only on supers - 3

Strong financials - 2
Application software - 1
Skilled staff - 1
Appeal to commercial customers - 1
Operating system - 1
Fast clock speed - 1
Near linear performances improve in multiproccessing system (X/MP-48) - 1
Relatively small company - 1

CRAY — Weaknesses
Price/performance at low end - 1
System software - 1
UNICOS operation system - 1
Hardware architectures (hardware/too many) - 2
Cost - 4
Lack of application software - 1
Tools and compilers (for vectorizing) - 3
New/different operating system - 2
Marketing to middle management - 1
Supporting software for large secondary stg devices (SSD) - 1
Non IBM-compatible OS - 1
Large company - 1
Growing too fast - 1

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
ETA
No opinion (101)
Will be strong only in niche applications such as weather forecasting and structural analysis (103)
Must get systems into production environments (104)
Super hardware; but worried about the timeliness of their software (105)
If software works, then they will be very powerful (106)
Impressive, technically sound; but no product (107)
CDC will live or die on the basis of the ETA 10 (108)
Must put a machine where their mouth is (109)
Would like to see them make it (110) (114)
Not in supercomputer business (111)
Jury is still out (112)
Users/tekkies were not impressed (113)
Heard you must compile software on other CPU before runs on ETA (115)
Wait & see (116)
A paper tiger. Must prove themselves (118)

Must be shown that they have anything of interest. CDC has lost much of its market (119)

ETA — Strengths
Memory size
Hardware - 4
Sheer speed - 2
Parallel processing architecture
Technology
New hardware design
Price/performance
Automated manaufacturing process
Hardware design staff
Separate company from CDC
Strong presence in government market, which wants competition to Cray

ETA — Weaknesses
No track record/no installed base - 2
Only one product
Lack of strategy for subsequent machines
Software/operating system - 5
Marketing
Risky technological approach - 2
Poor software support
Poor performance on short vector applications
Lack of a schedule
Hardware architecture (Based on Cyber 205) - 3

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
IBM
Aloof, indifferent on price negotiation, professional (101)
Not in engineering/scientific computer business (103)
Not in supercomputer market (104) (106) (113) (114)
Serves broad user base; good price/performance tradeoff (105)
Bending a bit (106)
Tentative in supercomputing (107)
Getting their feet wet (108)
They're late and they're learning (109)
They sell a near-supercomputer; not pushing the technological limits; very expensive in terms of price/performance (110)
Going to try hard (111)
Going after a large market — low end of super biz (112)
Not in that market (115)
Good strategy to add inexpensive VF to 3090 (116)

Behind Cray & others (117)
Technically 3090 is not a supercomputer (118)
3090 is good machine; Kingston staff wants to support this technology; software has worked well (119)

IBM — Strengths
Marketing/sales organization - 7
Good general purpose/scalar machine - 4
Track record - 2
Large installed base of mainframes to draw from - 1
Reliabile system - 2
Company image to top management - 1
MVS is a good batch-oriented system - 1
Size of organization - 1
Distribution - 1
Ability to soup up existing technology - 1
Good firm to do business with - 1
Service/maintenance - 1
Good R&D - 1
Software base - 1
Very affordable system - 2
Balance of scalar/vector processing capabilities - 1 (117)
Preference to do business with single vendor - 1

IBM — Weaknesses
Technology - 1
General purpose solution not always best one - 1 (117)
Lack of commitment to high end of supercomputer market - 3
Lack of recognition by scientists - 1
Unpopular operating system - 1
Slow performance of vector processing hardware - 3
Very expensive operating system to maintain - 1
Large organization - 2
Not a manufacturer of scientific/technical computers - 1
Field support (local people don't know much about vector processing) - 1

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
NEC
Cray-like in customer sensitivity and comfort level (101)
Will be very strong if they solve software problems (103)
Don't know of them (104)
Had no direct contact (107)
Very high-tech CPU; questionable US marketing practices (105)

HNS will be a very powerful company; they are going about it in the right way (106)
Good hardware; operating system is not compatible with anything; software must exploit hardware performance (108)
Nice system; very fast (110)
Hottest system on the market (111)
Could come out well (112)
Potentially strongest competitor, due to vertical integration & commitment by parent company to this market (118)
Don't know; haven't seen any salesmen (119)

NEC — Strengths
Customer sensitivity
Hardware technology - 5
Software technology
Speed - 1
Vertical integration - 1
Large company - 1
Support by Japanese government - 1 (118)

NEC — Weaknesses
Distance
Different culture - 2
Lack of application software - 1
System Software (one says it is slow & inefficient) - 2
Marketing
Low installed base
High price - 1
Japanese backlash - 2
Slow I/O - 1
Slow disks - 1

NEC — To Correct Weaknesses
Establish US manufacturing & support
Improve FORTRAN compiler
Put money and effort into software
Meet US government standard on data base access security
Tied up with Honeywell - 2 (118 believes Honeywell is weak partner)

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
AMDAHL
No image; never met an Amdahl salesman; not a familiar name (101)

(104)
Very strong in engineering/scientific part of business (103)
Has a very high tech system from Fujitsu but cannot figure out how to sell it (105)
We don't consider the Fujitsu CPU as a supercomputer (106)
Aggressive (107)
Fair product; have had hard time penetrating US market; must compete with Cray in hardware and software (108)
Uneven benchmarks; some ran well, others ran poorly (109)
Sells a near-supercomputer; coming along; success will depend on visibility (110)
Current machine is obsolete/outdated (111)
Will be strongest competitor in 1990s, with Fujitsu backing (111)
Don't know much about Fujitsu design (112)
Very impressed with them (113)
Manufacturer Reps in supers; success will be only in marketing (114)
PCM with large software base (115)
Have not bought any Amdahl mainframes ; were close on Fujitsu supercom (116)
Have been successful in limited number of segments (117)
Way behind NEC; Fujitsu CPU is a viable product; Amdahl doesn't rank highly in sci/tech market a la Cray; so different marketing is required (118)
Has potential, but he is not aware of other sales; be surprised if they had not sold more systems (119)

Amdahl — Strengths
Technical staff - 5
Engineering/scientific market is their only business - 1
Market share in engineering/scientific market - 1
U. S. marketing staff in place - 1
Fujitsu association/financial backing - 2
Good sales people - 1
Good hardware - 5
Superior software performance - 1
Excellent vectorizing tools - 1 (119)
Good compilers - 1
Best diagnostics printouts - 1 (113)
Organization structure - 1
Willing to bring in industry experts to help with their application - 1
Competitive prices/flexibility in price negotiation - 2
Compatibility with IBM - 3

None - 1 (110)
Cheaper/30% faster than IBM - 2 (115) (118)

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
Amdahl — Weaknesses
Customer support - 1
Operating system is not adaptable to communications -1
Poor (1 - Sci/Tech) marketing - 3
Lack of strategy - 1 (117)
Limited/lack of installed base, especially in US - 8
No name recognition - 2
No advertisting or marketing in business press; depends on word-of-mouth -1
Don't know how to sell supercomputer - 1
No hardware upgrade path - 1
Poor performance for short vector jobs - 1
Overall performance in engineering/scientific applications - 1
Nationalism issues affecting sales - 2 (110) (116)
IBM Compatibility - 3
Higher risk than IBM approach - 1 (119)

Amdahl — To Correct Weaknesses
Found legal working relationship with IBM
Introduced customized version of MVS
Doing nothing — is waiting for next generation CPU
Hire people from Cray and IBM
Is writing a UNIX-based operating system
More price competitive now (110)
Should build its own machines (111)
Should copy IBM VF for Amdahl 5890 but won't do this and will be hurt in longer term by not doing so (111)
Technology innovations - 1
Offer more performance for dollars (115)
UNIX OS (115)
DK, but favorable financials show they must be doing well for customers (117)
Minimize effect of selling Japanese CPU; improve market image (118)

VENDOR OVERALL IMPRESSION; STRENGTHS; WEAKNESSES
UNIVAC
1100 has strong vector capabilities; watch out for next
generation CPU (105)

22. WHAT WAS THE TARGET PRICE FOR YOUR SUPERCOMPUTER?
$3 - $5 million
$5 million (119)
$5 - $7.5 million - 2
$5 - $7 million excluding peripherals (had them) - 1
$5 - $20 million
$7.5 million
$8.5 million
$10 million

23. HOW MUCH IS SPENT ANNUALLY FOR HARDWARE MAINTENANCE?

- Standard for 370-architecture machines (111)
- Cray X/MP-48 is $1 million per year
- All 4 categories = $14 million in 1987 (113)
- Competitive (114)
- 10% of purchase price per year (for Cray 1/M-4400) (118)

24. GIVEN THE DIRECTION OF YOUR COMPANY AND INDUSTRY, WHAT DO YOU SEE AS THE TOP 3 SUPERCOMPUTER REQUIREMENTS IN THE NEXT FEW YEARS?

Industry-specific applications (autos; jet engines)
Multiprocessing capability - 2
Automatic multiprocessing - 1 (110)
Larger/faster main memory - 4
Very large amounts of disk space - 1
Improved price/performance - 4
More power/speed - 9
Improved/sustained (not peak) perf in scalar/vector applications - (111) (116)
Better use of/more parallel architectures - 3
Reduced cost of ownership/retain investment in SW - 2
UNIX / more features in UNIX - 2
Continued improvement in scalar performance - 3
Better vectorization/code optimization tools - 3
More reliable - 1
Support classified computing - 1
VAX/IBM mainframe network integration
More real-time applications - 1
High speed I/O - 2 (111) (112)

Comment: memory design technology has lagged processor design emphasis (111)
Workstation connectivity - 1 (118)
None — more concerned with workstations, micros, mid-tier systems (119)

24. C. WHAT INDUSTRY-SPECIFIC APPLICATION SOFTWARE WILL YOU NEED IN THE NEXT FEW YEARS?

Automobile/jet engine requirements
Analysis
SALT (Circuit simulation; sold by The CAD Group) (112)
Modelling software
Graphics software
Software which can be downloaded to Sun workstation (reason: problem can be run on super, results then downloaded to Sun for analysis)
Network-related software (for improved data collection and simulation)

25. A. DO YOU PLAN TO PURCHASE ADDITIONAL SUPERCOMPUTERS?

Yes - 7	No - 5 (but will buy in 3 yrs)
Didn't Know - 1	No Response - 1

(NOTE: Could answer yes to both 25 a/b)

25. B. DO YOU PLAN TO UPGRADE THE CPU WITHIN 1-2 YEARS?

Yes - 8 No - 4 Not Asked - 1

25. C. IF YES, PLEASE DESCRIBE THE UPGRADE.

Three year lease ends (no additional information)
Replace CPU in 1.5 - 2 years
More memory and more processors (IBM) (Cray) - 3
Will buy next generation Cray system
Upgrade CPU or buy another supercomputer
May add more processors to X/MP-24
Memory upgrade (IBM) (Cray) (111) (115)

26. HOW LONG WAS THE DECISION CYCLE TO PURCHASE A SUPERCOMPUTER?

- 2 months (Cray) (research done by engineering manager at other company)
- 3 months (CPU upgrade only)
- 6 months (has installed Cray; constant sales rep contact)
- 4 months (FPS site)
- RFP process: 18 months (111)
- 12 months (114)
- 7 months following RFP (115)
- 18 months (116)
- 6 months (118)
- 12 months (119)

27. HOW FREQUENTLY WERE YOU CONTACTED BY VENDORS?

IBM - 36 {S/M = 10 Tech - 85%} of respondent's
Cray - 36 {Tech = 26 Exec - 15%} time (see 111)
{Exec = 0)

Exec visits: IBM - 1 exec VP; Amdahl - 1 VP & 1 CEO (116)

28. A. WHICH VENDOR BEST HANDLED THE SALES PROCESS?

Cray - 5	FPS - 1
Amdahl - 3 (119)	IBM - 2
None! - 2 (109) (111)	

28. B. WHY DID YOU SAY THAT ____ VENDOR BEST HANDLED THE SALES PROCESS?

IBM was thorough in learning what it wanted. (105)
IBM focused its presentation on what it could do to meet customer needs. (105)
Amdahl did a good job but was not quite on target. (105)
Other vendors told them what they could do, not what would meet the user's needs. (105)
Cray is naive in marketing. IBM either thought it was shoo-in or had no hope. After IBM rep was told result of benchmark, he went away with no follow-up.

People were not qualified. (111)
Sales reps did not understand their own industry or own products. (111)
The winner was the one who botched least! (111)
FPS was aggressive in a cooperative & educational way. (113)
Cray handled on-site visit by 8 professionals well (114)
Amdahl - given the resources available & committed (116)
IBM - in-depth understanding of application; on-site sales rep (117)
Cray - no problems (118)
Amd - Set up benchmark nicely; effective proposal; very credible people (119)

29. PLEASE PROVIDE GENERAL COMMENTS ABOUT EACH VENDOR'S SALES REPRESENTATIVES.

Amdahl and Elxsi sold supercomputers like a regular computer.
They never got to the president or division general manager. Neither understood what it took to sell a supercomputer. (103)
Cray has gotten better. (109)
Varied widely among IBM/Amdahl/Cray/FPS. Some companies undermine their sales reps. They need tech support early in the process since they place a high value on technical content. (111)
Not disappointed with IBM/Amd people (116)
Amdahl - good probes on sales resistance & good technical followup (119)
IBM - good followup to their calls (119)
Cray - set up visit to major utility in Paris using Cray for his visit during vacation (119)

30. DID YOUR COMPANY REQUIRE BENCHMARK TESTS?

Yes - 12
No - 2 (118)

30.B. PLEASE PROVIDE COMMENTS ABOUT EACH VENDOR'S BENCHMARKS

IBM
It ran; looked good (105)
Ran well but could not afford manpower to run the OS (110)
1.4 - 1.5 times performance of Amdahl 5860 (111)
Concerned about IBM's memory architecture (111)
Very cooperative; outstanding service (113)
FTN compiler had problems (113)

Highly vectorized problems did not run well (113)
More difficult to get running then ran well (116)

Cray
X/MP beat Cray-2 fairly significantly; both beat 3090 VF
Best staff ability to vectorize problems
Best performance on short vector jobs
Good performance on long vector jobs
Ran much faster than IBM

NAS
Company was secretive about the components of the machine.
Customer's attitude became: if this is what we get now, then we can expect BIG problems later! (105)

Amdahl
Tried hard to make it run well
Never articulated a strategy to penetrate Fairchild (103)
Poor performance on short vector jobs (108)
1.8 times performance of 5860 (111)
Good memory architecture (111)
No vector capability on 5890 (111)
Scalar performance on 5890 is 1.5 times that of 5860 with same design features.
Can tell better than any vendor what percent of problem can be vectorized (113)
Excellent internal diagnostics (113)
Ran well from beginning (116)

31. A. FOR YOUR PARTICULAR BENCHMARKS, WHICH VENDOR'S SYSTEM RAN FASTEST?

First: Cray - 6 IBM - 1 NAS - 1 Amdahl - 1

Second: IBM - 3 Amdahl - 4 Amdahl or IBM - 1 FPS - 1

Third: IBM - 2 Amdahl - 1

Other: one site did not run Amdahl since they figured result would be close to IBM (103)

31. B. WHICH VENDOR DID THE BEST JOB IN BENCHMARKING?

Cray - 3
IBM -
IBM/Amdahl - 1
Amdahl - 1
Not evaluated — due to strong user in-house capabilities - 3
No standout - 2

31. C. WHY DID YOU SELECT THAT VENDOR AS THE ONE WHO DID THE BEST BENCHMARK JOB?

Amount of effort - 1
Committee assessment - 1
Best performance optimization (Cray) - 1
Most skilled personnel (Cray) - 1
Best support from headquarters (Cray) - 1
Most efficient compiling (Cray) - 1
Not evaluated — due to strong user in-house capabilities - 2
Done after-the-fact; previous experience with Cray thru T/S (115)
Amdahl (116) - Sunnyvale based tekkie was excellent. IBM used local SE.

31. D. WHAT WAS THE MAJOR BENCHMARK CRITERIA?

a. Thruput? - 2
b. Single Job Performance? -
c. Anticipated job Performance? -
d. Combination? (Letters refer to above benchmark criteria)
  a & b - 3
  a & c -
  b & c - 1 (119)
  Unknown - 2

32. WAS THE PRICE NEGOTIATED?

Yes - 6
No - 8

Negotiate: Date payment begins
No: Use volume purchase agreement (BCS)
Competitive bid (113)

33. A. HOW IMPORTANT IS THE PURCHASE PRICE IN THE COST OF ACQUISITION OF A SUPERCOMPUTER?

Very important - 4
Medium importance - 7
Not very important - 5

33. B. WHY?

Most important criterion
Upper management concern
You're buying capability and position in your market, not a new car!
Once the decision is made to buy a supercomputer, then you're considering the technical soundness of the system
Cost effectiveness vs. timesharing
Always consider price
Competitive bid forces the lowest price - 2
We knew what we had to pay! - 1
Uses life cycle costing (government) - 1
Cost of conversion (if non-IBM/PCM) was bigger issue - 1
Affects price/performance calculation - 1 (system is leased)
Part of overall cost - 1 (119)

34. A. HOW IMPORTANT IS THE OPERATING COST IN THE DECISION TO PURCHASE A SUPERCOMPUTER?

Very - 4
Medium importance - N/A
Not very - 5

34. B. WHY?

High cost of electricity - 2
Had to have funds for support staff - 1
Used five-year life cycle cost of ownership calculation - 4
Government uses system integrators to minimize cost - 1
Has an enormous installation; one extra machine is not a big deal - 1 (109)
Manpower is most important component of operating cost
UTx has run large CPUs for 20 years, understands support requirements
Secondary consideration
IBM mainframes require expensive internal group for system software and system operation (119)

34. C. WHAT ARE THE BENEFITS OF ONE VENDOR SELLING BOTH GENERAL PURPOSE COMPUTERS AND SUPERCOMPUTERS?

Not that big a deal since we already deal with many vendors.
If a product integrates and communicates well, then the fact it's from another vendor doesn't matter. (109)
Very nice in theory since less manpower to support one operating system.
But we need VAX ease of use with Cray power and nobody has that (110)
Real issue is mixing general purpose and supercomputer capabilities on same machine. Cannot have a decent super without decent general purpose architecture underneath. Cray is only a floating point architecture, ignoring vectorizing, logic, and integer operations. A good g.p. computer could actually run faster than a Cray (111)
IBM is trying to do that. However, tradeoff better performance of special systems and utilization of GP system — prefers high utilization due to more economical operation (113)
We're in an age of specialization; we expect to use multiple vendors. Standards enable choice of vendors. To expect one vendor to do it all is wishful thinking (114)
Not convinced of advantage of one vendor. Most difficult conversion he did was IBM-IBM due to disparate special architecture (115)
Would have software compatibility (116)
Precisely why we looked at Amdahl & IBM; same CPU can be used for business data processing and seismic computations at deployed sites (117)
Seen as deterimental. A vendor can do 1-2 things well. If they are selling a wide range of products then efforts are no longer concentrated and cannot do as good a job. (118)
Advantage is not having to learn another operating system or set of languages (119)

35. HAS YOUR _______ SUPERCOMPUTER PERFORMED AS EXPECTED?

CRAY
Yes - 8
No -
No Response - 1 (Still in acceptance testing)

IBM
Yes - 4
No - 1

FPS
Yes - 1

35. B. WHAT AREAS SURPASSED EXPECTATIONS?

Cray
- Uptime (Reliability) - 2
- Time needed to bring system up & get running - 1
- Ease of porting some software - 1
- Graphics channel speed - 1
- None - 4

IBM
- Reliability - 4 (105)(106)(117)(119)
- Number of jobs processed - 1 (119)
- Vectorizing FORTRAN compiler far exceeded expectations and performance of regular FTN compiler -1 (119)
- None - 2 (111) (116)

FPS
- Much higher thruput in certain applications - 1 (113)

35. C. WHAT AREAS DID NOT MEET EXPECTATIONS?

Cray
- None - 3
- Vectorization of some software - 1 (103)
- Hardware reliability a bit worse than expected - 1
- Ease of use of partly processing - 1

IBM
- Need detailed technical information in a timely manner. Better documentation, too, since we have in-house staff of 45 supporting proprietary modifications to IBM system software - 1 (105)
- The faculty expressed a "pro-IBM" senitment, based on their belief that IBM is a safe choice, although they have had pervious experience with Cray on a timesharing basis - 1 (107 - Purchased a USED Cray X/ MP-24)
- Runs a bit slower than anticipated (111)
- Compiler less than great, but aware before purchase (117)
- Scientific subroutines (117)
- None - 1 (119)

FPS
- Lower thruput in applicats with <50% vectorization (113)

36. DO YOU HAVE ANY OTHER COMMENTS?

Cray

- Installed and running in less than 2 days (101)
- Is a combination vector/scalar machine, while ETA is a vector processor only (103)
- Apple was beta testing a 100 MB/sec channel board (112)
- Too big given: (a) worldwide dist'n & support; (b) smaller increments of power between CPUs (117)
- Pres of T/S company used to work for Cray (118)
- Cray is very heavy; requires reinforced flooring. Also tremendous air conditioning requirement (119)

Amdahl

- Amdahl missed the window. They should have been more aggressive when the machine was first announced to get some installations. Must wait until the next generation CPUs. (105)
- They don't know how to sell a supercomputer. Since they are selling on the basis of IBM compatibility, why would a customer buy a new machine when IBM sells the add-on VF option? (106)
- (In response to: Will Amdahl be able to successfully compete with Cray?) It's possible, but Amdahl is a complicated company. The US decides on producrt features and marketing but the technology is in Japan. (107)
- One of 3 vendors (others: NAS/NEC) whose bid exceeded $8 million. Cray offered used Cray-1 for <$7.5 million but bid was late. (113)
- Amdahl sells across industries & applications. Harder to keep focused on supercomputing needs. (114) Amdahl is: (a) more willing to negotiate; (b) better able to respond to customers than IBM. In this case, Amdahl's primary contact was transferred to TI. (117)

NEC

SX-2 is very expensive ($20 million vs. $8 million for Cray X/MP-14) (109)

NAS

NAS processor ran up to 3 times as fast as 5860 but had primitive vector processing capability and a high price.

NAS paid no attention to PG&E procurement process and especially didn't get benchmark set up; was eliminated. (119)

FPS

Sent VP marketing & VP technolology to site. Others sent regular sales managers. Had 75 contacts with client vs. 50 for NAS/Amdahl and 10 for Cray (who started late in cycle)

FPS established a chair in computational methods with emphasis in parallel processing at LSU (113). FPS' Baton Rouge office located on LSU campus.

IBM

One site would like IBM to offer VF on smaller MF such as 3033. Was using 3033 with 3838 AP and is looking to migrate all to 3090 series CPUs. (116 - GSI)

General

Multiprocessing capability is of strategic importance. Want to position themself to understand multiprocessing and parallel processing, since sci/tech processing is more interdependent than business data processing. However, multiprocessing exacerbates flaky software problems (119)

B

Appendix: European Responses (Losses and Wins) Tabulation

B

Appendix: European Responses (Wins and Losses)–Tabulation

Introduction

As part of this project, INPUT provides a complete tabulation of responses. The following guidelines will enable the reader to fully utilize the information contained in the body of the Appendix.

- The numbers at the beginning of each tabulation correspond to the number of the question in the original questionnaire.
- The number of responses within each category is shown in parentheses.
- Every effort has been made to capture the gist of each respondent's comments. For questions of a qualitative nature, quotes are provided, although quotation marks are not shown.

INPUT normally conducts its interviews on a confidential basis. Respondents to this interview process were not told that their responses would be kept confidential. However, Amdahl should use discretion in using results where the respondent can be identified or is specifically identified.

For Europe, tabulations for accounts where Amdahl won are combined with those for accounts where Amdahl lost.

- Accounts where Amdahl won are numbered: 203, 204, 205, and 207

1. WHICH SUPERCOMPUTER(S) DO YOU HAVE INSTALLED?

Cray X/MP - 4 (201) (208) (209) (210)
None (prospect) - 1 (202)
Amdahl VP 1100 - 4 (203) (204) (205) (207)
ETA 10 - 1 (206)
Siemens (Fuj VP 200)

2. D. DO YOU PLAN TO PURCHASE A MINISUPERCOMPUTER?

Yes - 1 (210)
No - 9
Not asked - 1 (206)

2. E. WHY (DO YOU PLAN TO PURCHASE/NOT PURCHASE A MINISUPERCOMPUTER?)

No – Cray X/MP has plenty of capacity (201)
No – Not asked (203) (204) (205) (211)
No – Just bought the Cray X/MP (208)
No – Will expand the X/MP CPU instead (209)
Yes – Need more power in 5 research branches; minisupercomputer would be a price-effective choice (210)

3. WITH OTHER MANUFACTURERS' COMPUTERS DO YOU EXPECT YOUR SUPERCOMPUTER TO SHARE DATA?

IBM - 7
IBM 3090 - 1
DEC VAX - 3
Apple
Silicon Graphics
CadNetix
Other DEC minis
Gould S.E.L.
None - 1 (205)
Siemens - 2

IBM PCM - 2

IBM 308X/303X
DG Eclipse
Daisy
CDC Cyber
Alliant
Concurrent
Amdahl

7. A. WHAT WERE THE TOP 3 PURCHASE DECISION CRITERIA?

Too much workload for existing CPUs - 1 (203)
CPU capacity - 3 (205) (210)
Processing speed - 1
Performance - 3 (204) (207) (208)

Price - 4 (205) (207) (208) (209)
Price/performance - 1 (211)
Available application software - 2 (211)
State-of-the-art chip technology/technology - 2
Good vectorization software (FTN, too) - 4 (201) (203) (204) (209)
Supports guaranteed minimum load - 1 (202)
IBM compatibility - 3 (203) (204) (207)
Ease of use - 1 (205)
Complete task within 20 minute specified timeframe - 1 (206)
Stable product (not low serial #) - 1 (208)
Reliability - 1 (210)
Compatibility with Cray - 1 (210)
Relationship with vendor as a company - 1 (211)

7. C. WHAT OTHER CRITERIA WOULD YOU CONSIDER IMPORTANT IN THE PURCHASE OF A SUPERCOMPUTER?

Price - 3 (210)
Hardware Maintenance - 5 (205) (207) (208) (210)
Software Maintenance - 5 (205) (207) (208) (210)
Reliability - 1 (204)
Reliability of hardware - 1 (203)
Reliability of software - 1 (203)
Speed - 1 (205)
Availability of application software - 1 (207)
Confidence in the vendor's survivability - 1 (208)
Communicate with IBM & DEC computers - 1 (209)
Operating costs - 1 (210)

8. A. DID THE DECISION CRITERIA CHANGE?

Yes - 2 (202) (207)
No - 9 (201) (203) (204) (205) (206) (208) (209) (210) (211)

8. B. IF YES, HOW?

- Installed IBM CPUs forced compatibility & low price (202)
- At first, we didn't think we could get compatibility with IBM. When we found out we could get it, then this was made a priority criterion.

9. E. WHAT COMMUNICATION PROTOCOLS ARE NECESSARY IN YOUR SUPERCOMPUTER OPERATION?

Ethernet
HyperChannel
DECnet - 1
X.25

TCP/IP - 2 (208) (209)
AppleTalk
NJE
ISO
ARPAnet
NASA SPANet
SNA - 3 (201) (203) (211)
UDP/IP
Async.
IR
Bitnet
NSFNet
CSNet
EFTAM - 1 (208)
"All IBM Protocols" - 3 (204) (205) (207)
ISO/Class IV - 1 (208)

11. WHAT EFFECT DID NEC/AMDAHL/HITACHI SELLING A JAPANESE MADE SUPERCOMPUTER HAVE ON THE PURCHASE DECISION?

Negative effect
- Philips sees Japanese as competitors (202)

No/minimal effect
- No importance - 6 (201) (203) (204) (205) (210) (211)
- Not an issue; except for evaluation of post-sale system support and service (206)

Positive effect
- It is believed the quality is very good (207)
- Add: In fact, Japanese technology is very good (205)

12. B. WHY DO YOU PERCEIVE _____ AS THE TECHNOLOGY LEADER?

CRAY
- Market leader (204) (205)
- First to market (202) (207)
- Large installed base - 4 (202) (208) (210) (211)
- Other firms are building in Cray compatibility (207)

FUJITSU
Most technically advanced - 1 (201)

ETA
Same channel rate as Cray; but smaller (203)
Parallel processing (203)
2nd leading supplier of supers (205)

AMDAHL
Price (205)

14. VENDORS – OVERALL COMMENTS; STRENGTHS; WEAKNESSES CRAY

- Well implanted in the scientific community; relate well to supercomputer gurus (201
- They are the leaders (202)
- Good company; large installed base - 2 (203) (204)
- Leading supercomputer vendor (204)
- Leading vendor; sell more than they can build (205)
- Market leader; inflexible (207)
- Made decision to be market leader; great market presence (208)
- Leading supplier (209)
- Experienced, reliable producer. Technology leader with most installations; reliable, user friendly, reliable FTN compiler; efficient. Cray-2 not as good. (210)
- Very good; well known, widely used (211)

Cray – Strengths
Marketing to maintain aura as THE super mfr - 1 (201)
Wide selection of application SW - 1 (201)
Focus on supers - 1 (201)
No response - 2 (202) (211)
Speed - 2 (203) (204)
Lots of memory - 1 (204)
Market leadership - 3 (205) (207) (208)
X/Mp is well designed, balanced performance, and lives up to claims in brochures (210)

VENDOR OVERALL COMMENTS; STRENGTHS; WEAKNESSES

Cray – Weaknesses
Small company compared to IBM - 1 (201)
Limited R&D resources - 1 (201)
Not IBM compatible - 1 (203)
Reliability - 2 (203) (208)
No response - 2 (202) (211)
Expensive pricing - 1 (208)
Inflexibility (generally on pricing) - 2 (204) (207)
None - 1 (205)
Cray-2 is unbalanced; FTN compiler is not well designed (210)

ETA
Very powerful on paper; too powerful for their needs (201)
Part of CDC - 1 (202)

Look very interesting on paper - 1 (203) (205)
Don't know them - 2 (204) (209)
Good for weather forecasting - 1 (206)
Too new - 1 (207)
Made heavy investment in marketing without the machine - 1 (208)
Software problems (210)
Must prove itself. They closely monitor ETA installations in Europe and, if they meet expectations, will be a system to be seriously considered. (210)
Very strong performance claims which must be met (211)

ETA – Strengths
Very powerful system (201)
Very innovative - 3 (202) (207) (208)
Technology - 1 (203)
Economical - 1 (206)
DK - 3 (205) (209) (210)
Capacity (211)

ETA – Weaknesses
Few installations - 2 (202) (208)
DK - 4 (203) (205) (209) (211)
Software - 1 (207)

IBM
Marginal business to IBM; not part of main strategy (201)
Don't really have a supercomputer; but offers additions to existing systems (202) (203)
They are IBM; speaks for itself (204)
Not a supercomputer manufacturer; do not seem interested in this market (205)
Not really in this market (207)
Not a supercomputer vendor (208)
Good to have a vector processor coupled to a general purpose computer because speed of front end computer will become more important (209)
Not really a supercomputer manufacturer - 1 (210)
Don't really have a supercomputer (211)

VENDORS – OVERALL COMMENTS; STRENGTHS; WEAKNESSES

IBM – Strengths
Dominant market position - 2 (201) (204)
Intermediate computing solution (201)
No response - 7 (202) (203) (207) (208) (209) (210) (211)
None - 1 (205)

IBM – Weaknesses
System isn't powerful enough (201)
Not compatible with more powerful systems - 1 (203)
No response - 5 (202) (207) (208) (210) (211)
Not enough vector processing capacity - 1 (204)
Lack of interest in this market - 1 (205)
Too new to this market - 1 (209)

NEC
Not really present in Europe (201)
One doesn't hear much of them in supercomputers (202) (203)
Good in Japan; not very active in Europe (207)
DK - 4 (205) (208) (209) (211)
Low profile in Europe. Looks very interesting; OS is a bit exotic - 1 (210)

NEC – Strengths
DK - 7 (201) (203) (205) (208) (209) (210) (211)
No response - 1 (202)
Good technology - 1 (207)

NEC – Weaknesses
DK - 7 (201) (203) (205) (208) (209) (210) (211)
No response - 1 (202)
European sales and marketing - 1 (207)

NEC – To Correct Weaknesses
No response - 6 (202) (205) (208) (209) (210) (211)
Nothing - 1 (207)

AMDAHL
Fujitsu is new in market - 2 (201) (209)
Two years ago had very good vectorization software (202)
Don't have many installations - 2 (202) (210)
Long-standing relationship with GECO since 1980 - 1 (203)
Small company but very good - 1 (204)
Very reliable hardware; least expensive equipment; very good sales people (205)
They are lucky that they are selling Fujitsu (207)
DK - 1 (208)

VENDOR OVERALL COMMENTS; STRENGTHS; WEAKNESSES

Amdahl – Strengths
Very advanced supercomputer - 3 (201) (204) (207)
Good support - 1 (204)
No response - 2 (202) (209)
IBM compatible - 2 (203) (207)
Flexible pricing - 1 (207)
Software - 1 (207)
Reliable - 3 (203) (205) (211)
Ease of use - 1 (205)
Low operating cost - 1 (210)
DK - 1 (208)

Amdahl – Weaknesses
Limited application software - 2 (201) (205)
No multiprocessing capability (201)
Small company - 1 (201) (204)
No response - 3 (202) (203) (209)
Don't manufacture the system themselves - 1 (207)
Cannot provide same support as Cray; too little experience and sales know-how -1 (210) DK - 1 (208)

Amdahl – To Correct Weaknesses
DK - 5 (201) (204) (207) (208) (210)
No response - 2 (202) (209)
Have team to try & develop application software, but are too small to develop enough applications - 1 (205)

Siemens
Not established yet; not enough support/backup (210)

Fujitsu
Very good (211);

20. WHAT INFORMATION DID YOU LEARN ABOUT VENDORS AS A RESULT OF REFERENCE CHECKS?

IBM/Amdahl had no reference accounts at the time (201)
Mercedes, VW, Saab, and Fiat all use Cray and are happy (201)
Cray had good image & comments; good general impression (202)
IBM & Amdahl didn't have European installations; new products (202
Cray & CDC – both checked out fine (205)
Cray: Previously used one through U.K. service bureau (206)

Unidentified: Users contacted had little experience; not useful information; unimportant (207)
Cray – generally good, nothing detrimental (208)
Nos; no response (209) (210) (211)

21. WHAT INDUSTRY-SPECIFIC APPLICATIONS WERE IMPORTANT IN THE PURCHASE DECISION?

Finite element calculations for aerodynamics, combustion, and crash simulation (201)
Semiconductor design and development (202)
Seismic data acquisition (205)
Engineering, chemistry, astronomy university applications (207)
Easy-to-program software to enable wider usage (207)
Particle research (but done in-house) - (208)
Structural analysis (FEM/FDM) - 1 (211)
Graphic animation - 1 (211)
Chemistry - 1 (211)
Models for quantum physics - 1 (211)
NASTRAN - 1 (211) for structural analysis & vectorized K-Tracing (211)

22. WHAT IS THE TARGET PRICE FOR YOUR SYSTEM?

NR (201)
Cray - $22 million DFl (guilders); IBM VF (2-3 million DFl) (202)
Amdahl - $5 million (203)
Amdahl - 50 - 100 million NKr (= Approx $10 million US) (205)
Cray - 10 million DM (209)

23. HOW MUCH DO YOU BUDGET ANNUALLY FOR HARDWARE MAINTENANCE?

NR - 4 (201) (202) (203) (210)

24. GIVEN THE DIRECTION OF YOUR COMPANY AND INDUSTRY, WHAT DO YOU SEE AS THE TOP 3 SUPERCOMPUTER REQUIREMENTS IN THE NEXT COUPLE YEARS?

Interactive graphic software (201)
More balanced system (faster channels & peripherals) - 1 (203)
Faster scalar unit (203)
Parallel processing (203)
Multiprocessing - 1 (211)
More vector processing capability - 1 (204)
More capacity/larger main memory - 3 (207) (209) (211)

Ease of access - 1 (207)
Wider network - 1 (207)
Better overall performance - 1 (208)
More reliable - 1 (208)
High speed front end channel - 1 (209)
Fundamentally nothing will change - 1 (210)

24. C. WHAT INDUSTRY-SPECIFIC APPLICATION SOFTWARE WILL YOU NEED IN THE NEXT FEW YEARS?

Applications software for electronics development (202)
None (203)

25. A. DO YOU PLAN TO PURCHASE ADDITIONAL SUPERCOMPUTERS IN THE NEXT 1-2 YEARS?

Yes - 2 (202) (211)   No - 7 (201) (203) (204) (205)
No (cnt'd): (207) (208) (209) (210)
DK -   NR - 1 (206)
(NOTE: Could answer yes to both 25 a/b)

25. B. DO YOU PLAN TO UPGRADE THE CPU WITHIN 1-2 YEARS?

Yes - 4 (207) (209) (210) (211)
No - 3 (201) (205) (208)
Maybe - 2 (203) (204)
NR - 1 (206)
Not Asked - 1 (202)
NOTE: respondent 211 sees additional/upgrade CPU as alternatives

25. C. IF YES, PLEASE DESCRIBE THE PLANNED UPGRADE.

Upgrade the backup memory (210)

26. HOW LONG WAS THE DECISION CYCLE?

- 4-5 months (bid) - 1 (207)
- 6 months - 2 (201) (204)
- 9 months - 4 (203) (206) (208) (209)
- 18 months - 2 (210) (211)
- Unknown - 2 (202) (205)

27. HOW FREQUENTLY WERE YOU CONTACTED BY VENDORS?

- Approx 20/month/vendor (201)
- About 12 times in UK then went to US for benchmarking (203)
- One to two times per week, on average (204)
- Only twice for all vendors (207)
- 2/month for Cray (208)
- Wanted minimum contact throughout; nevertheless had 2 sales/marketing, 8 technical visits, and no executive visits (209)
- 18 contacts (211)

Executive visits:
- Once or twice (201)
- Some from Cray, Siemens, CDC (211)
- None (207) (208) (209)

28. A. WHICH VENDOR BEST HANDLED THE SALES PROCESS?

Cray - 2 (201) (208)   FPS -
Amdahl - 4 (203)(204)(205)   IBM - 1 (202) (207)
None! - 2 (all good - 206 & 211)
No response - 2 (209) (210)

28. B. COMMENTS ABOUT VENDORS' HANDLING OF THE SALES PROCESS

Because they were only ones to have systems running with real applications. IBM had not completed development; Amdahl benchmarking was difficult (201)
Proposed adding VF to existing MF at 1/7th the cost of a Cray supercomputer. (202)
More responsive; when GECO told IBM their compiler wasn't very good, IBM just wouldn't believe it and was not discussing it (203)
Most cooperative; easy benchmarking (204)
Most interested in making a sale; put most effort into it (205)
Amdahl: Flexible; could quickly answer any technical question (207)
Cray: None. (208)
Cray: No response (209)

29. PLEASE PROVIDE COMMENTS ABOUT VENDORS' SALES REPRESENTATIVES.

- All were professional (201)
- IBM - generally OK (203)
- Amdahl - Happens to have former geophysical programming specialist

as contact man, so he knew GECO's business very well. (203)
- All very similar & professional (204)
- Cray: Sales people didn't make much effort (205)
- CDC: Polite (205)
- Amdahl: Trying hard (205)
- All good & professional; no difference between them (206)
- Both were professional & good (208)
- No response (209) (210)
- All professional (211)

30. DID YOUR ORGANIZATION REQUIRE BENCHMARKS?

Yes - 9 (201) (203) (204) (205) (206) (208) (209) (210) (211)
No - 1 (But ran one year earlier - 207)
Not asked - 1 (202)

30. B & C. PLEASE GIVE COMMENTS ABOUT THE GOOD AND BAD POINTS OF EACH VENDOR'S BENCHMARKS.

IBM
Good - nothing (203)
Bad - difficult to get into system since company was so security conscious (203)

Cray
Good overall performance (201)
Easy to test because they previously had a Cray and could use the FORTRAN compiler. (209)

30. COMMENTS ABOUT VENDOR'S BENCHMARKS (CONTINUED)

Amdahl
No commercial software available; cumbersome & difficult (201)
Generally very good (203)
Nothing bad (203)
Performed as promised - 1 (204)

All
Performed equally well (205)
Important to have balanced overall performance versus high performance in some areas and low performance in others (210)
No difference between vendors - 1 (211)

31. A. FOR YOUR PARTICULAR BENCHMARKS, WHICH VENDOR'S SYSTEM RAN FASTEST?

First: Cray - 1 IBM - NAS - Amdahl - 2 (204)
Won't say - 2 (209) (210)

Second: IBM - 1 (204) Amdahl - 1
Amdahl or IBM - FPS -
Cray - 1 (209)

Third: IBM - 1 Amdahl - Won't say - 1 (209)

NOTE: 209 said all were very similar. They selected a Cray, although Cray came in second in benchmarks.

31. B. WHICH VENDOR DID THE MOST PROFESSIONAL JOB IN BENCHMARKING?

Cray - 1
IBM -
IBM/Amdahl -
Amdahl - 3 (203) (204) (207)

31. C. WHY DID THAT VENDOR DO THE BEST BENCHMARK JOB?

Cray – had everything readily available (201)
Amdahl – showed GECO how to optimize compiler; much better co-operation than IBM (203)
Amdahl – Amdahl was always providing everything; whereas with IBM we had to ask them for everything (204)
IBM – less forthcoming than Amdahl (204)
Amdahl – no response (207)

31. D. WHAT WAS THE MAJOR BENCHMARK CRITERIA?

a. Thruput? - 2 (205) (207)
b. Single job performance? - 1 (Weather - 206)
c. Anticipated job performance? - 3 (203) (204) (209)
d. Combination? (Letters refer to criteria listed here)
a & b -
a & c - 2 (201) (208)
b & c - 1 (211)
Combination unknown - 1

32. WAS THE PRICE NEGOTIATED?

Yes - 7 (201) (203) (204) (207) (208) (209) (211)
No - 1 (Bid - 206)
DK - 1 (210)

32. C. WHAT WAS THE DISCOUNT RANGE?

- 15% (Amdahl) - they bought 3 machines (203)
- No response; however, part of deal was Cray had to take back old system (209)

32. WHAT WAS THE SYSTEM LIST PRICE?

- $6 million (201- Cray X/MP)
- $22 million DFl (guilders) for used Cray
- $2-3 million DFl (guilders) for IBM add-on VF
- $4 million US for 3 Amdahl computers
- 50 million DM (deutsche marks)

33. A. HOW IMPORTANT IS THE PURCHASE PRICE IN YOUR ORGANIZATION'S DECISION TO PURCHASE A SUPERCOMPUTER?

Very important - 6 (203) (205) (207) (208) (209) (211)
Medium importance - 3 (204) (206) (210)
Not very important - 1 (201)

33. B. WHY?

- Processing capability is much more important (201)
- Uses price/performance and useful life (affected by upgradeability of the machine) (203)
- Price was important in relation to performance (204) (210)
- Choice was made on basis of price (205)
- Part of price/capability (206)
- Lower than expected price made purchase possible, rather than rental (207)
- Budget constraints (208) (209) (211)

34. A. HOW IMPORTANT IS THE OPERATING COST IN YOUR ORGANIZATION'S DECISION TO PURCHASE A SUPERCOMPUTER?

Very - 1 (207)
Medium importance - 1 (210)
Not very - 8 (201) (203) (204) (205) (206) (208) (209) (211)

34. B. WHY?

Small amount by comparison - 4 (201) (203) (205) (206)
Similar for all supercomputers - 4 (204) (208) (209) (211)
They are a public body - tight budgets (207)
Overall costs are important - 1 (210)

34. C. WHAT ARE THE BENEFITS OF ONE VENDOR SELLING GENERAL PURPOSE MAINFRAMES AND SUPERCOMPUTERS?

DK - 1 (201)
- Good; makes things cheaper (202)
- Good; 1 vendor for CPU, disks, front end computers; 1 vendor for maintenance contract, too (203)
- None; would make them too dependent on 1 supplier (204)
- Very good; would save costs (205)
- Good; would make things easier to deal with 1 vendor (206)
- Good; would make things easier (207)
- Good; if computers are compatible (208)
- Good; would make things easy; but likely impossible (209)
- Good; would make things easier but impossible to achieve (210)
- Good; would make things simpler (211)

35. HAS YOUR _______ (fill in) SUPERCOMPUTER PERFORMED AS EXPECTED?

CRAY
Yes - 1
No
No Response - 3 (not yet installed - 208) (just installed - 209) (210 - operating for 1 week)

IBM
Yes
No

FPS
Yes

Amdahl / Fujitsu
Yes - 4 (203) (204) (207) (211)
No
DK - 1 (205)

ETA
Still installing - 1 (206)

35. B. WHAT AREAS SURPASSED EXPECTATIONS?
Cray
- Speed - 1 (201)

IBM
- Reliability
- Number of jobs processed
- Vectorizing FORTRAN compiler far exceeded expectations and performance of regular FTN compiler
- None

Amdahl / Fujitsu
- Ease of migration (203)
- Better overall performance than expected - 2 (207) (211)
- None - 1 (204)

35. C. WHAT AREAS DID NOT MEET EXPECTATIONS?

Cray
- None - 1 (201)
- Vectorization of some software
- Hardware reliability a bit worse than expected
- Ease of use of parallel processing

FPS
- Lower thruput in applications with <50% vectorization

Amdahl
None - 2 (204) (207)

36. DO YOU HAVE ANYTHING TO ADD?

Amdahl
Parallel processing will become important in future (203)

General

Supercomputer manufacturers. make more and more powerful machines with high speed channels but don't think enough about user interface and communication to distributed users. It is analogous to building a bigger and taller office building without installing elevators to reach the new floors or areas. They should make the systems more balanced. (201)

Bought 3090 VF for existing MF in tech computer center and established a data link with Cray super in U.K. (202)

Vendor personality is unimportant; what counts is total points under the rules of procurement (206)

The evaluation process and purchasing decision was very scientific and image/emotion did not enter into it (207)

In June 1986 didn't compete in supercomputer market and Amdahl did not approach them. (208)

C

Appendix: United States Prospects–Tabulation

C

Appendix: United States Prospect Responses–Tabulation

Introduction

As part of this project, INPUT provides a complete tabulation of responses. The following guidelines will enable the reader to fully utilize the information contained in the body of the Appendix.

- The numbers at the beginning of each tabulation correspond to the number of the question in the original questionnaire.
- The number of responses within each category is shown in parentheses.
- Every effort has been made to capture the gist of each respondent's comments. For questions of a qualitative nature, quotes are provided, although quotation marks are not shown.

INPUT normally conducts its interviews on a confidential basis. Respondents to this interview process were not told that their responses would be kept confidential. However, Amdahl should exercise discretion in using results where the respondent can be identified or is specifically identified.

Only relevant questions were asked of prospects.

---

1. WHAT SUPERCOMPUTERS DO YOU HAVE INSTALLED?

Cray X/MP - 5 (301-2) (304) (305) (307) (308)
None - 5 (302) (303) (306) (309) (310)

2. D. DO YOU PLAN TO PURCHASE A MINISUPERCOMPUTER?

Yes - 3 (304) (306) (307)
No - 4 (301) (303) (305) (308)
Don't Know/Not asked - 3 (302) (309) (310)

2. E. WHY?

No — Incompatibility; lack of application software (301)
No — Installed a Convex (303)
No — Marginal economics; need better UNIX & lower price (305)
No — Have 4 Convex systems installed (308)
Yes — Will upgrade Convex to dual CPU system (304)
Yes — Will help solve a class of problems (306)
Yes — Just bought a Convex; perfect machine for certain size applications (307)

3. WITH WHAT OTHER MANUFACTURERS' COMPUTERS DO YOUR SUPERCOMPUTERS SHARE DATA WITH?

IBM M/F - 4
Amdahl - 1
DEC VAX - 5
Alliant - 1
Convex - 2
CDC Cyber - 1

7. A. WHAT WERE YOUR ORGANIZATION'S TOP 3 PURCHASE DECISION CRITERIA IN ORDER OF IMPORTANCE?

Solve problems/do advanced computing - 2 (301) (305)
Application-specific requirements - 1 (305)
General purpose architecture - 1 (306)
Machine being used by users - 1 (307)
Cost - 2 (301) (307)
Price/performance - 1 (303)
Service & support - 1 (301)
Speed/power - 2 (303) (307)
Compatibility with DEC VAX FTN compiler - 1 (303)
Software conversion - 1 (306)

7. C. WHAT OTHER DECISION CRITERIA WOULD YOU CONSIDER IMPORTANT?

Compatibility with installed Cray - 1 (305)
Vendor commitment to UNIX - 1 (305)

9. E. WHAT COMMUNICATION PROTOCOLS ARE IMPORTANT IN YOUR SUPERCOMPUTER OPERATION?

SNA - 1 (303)
Internal system - 1 (301)
DK - 1 (302)
DECnet - 1 (306)
Possibly DECnet - 1 (303)
Not asked - 4 (304) (308) (309) (310)
DataKit - 1 (305)
National Labs' Protocol - 1 (307)
TCP/IP - 1 (307)

11. WHAT EFFECT DID NEC/AMDAHL/HITACHI SELLING A JAPANESE MADE MACHINE HAVE ON THE PURCHASE DECISION?

Negative effect
- Local management (vs. Corporate) decision - 1 (301)
- Harder to sell Japanese CPU to government - 1 (307)

No/minimal effect
- No importance - 3 (303) (304) (305)

Positive effect
- None

Not Asked - 5 (302) (306) (308) (309) (310)

12. B. WHY DO YOU PERCEIVE _____ AS THE TECHNOLOGY LEADER?

CRAY
- On-going research (301)
- Satisfaction with service & support (301)
- They are the name I hear most (302)
- Have not done a thorough job of researching others (303)
- First to market (304)
- Still have the fastest gun in the west (304)
- Traditionally served vector processing computing (305)
- Understands both the technology and the use of their machines (305)

- Mr. Cray understands strong scalar computing requirements by users; strong scalar performance is no accident (305)
- Fastest iron useable by people with their skill level (ease of use) (306)
- Flexible (306)
- General purpose system (306)
- Based on future products (307)
- Don't know much about the others (309)

Not asked - 2 (308) (310)

14. VENDORS — OVERALL IMPRESSIONS ONLY

CRAY

- The best (301)
- Very good reputation. Would consider them if looking for a standalone machine (303)
- Fast; not cost effective (304)
- Very solid; Question: What is effect of Chen's departure? (A one-man show for Seymour Cray?) (305)
- Granddaddy of them all. Cream of the crop (306)
- Great company; the leader; good to work with (307)

ETA

- Must prove itself. Worth looking into. (301)
- Satisfied with the speed of the system (304)
- Dark horse; He doesn't know what is actually up and running, esp. at Princeton Computing Center (305)
- Trying very hard. Upstart. If ETA 10 is anywhere near as good as the claims, then it will be a helluva machine — too bad it has no operating system (306)
- Did not talk with them. Announced a product but we'll see. CPU is void of software (based on experience with CDC and she expects an attitude carry-over to ETA) (307)

IBM

- Yet to make their stand. VF reprsents a foray into the market. (301)
- Great if they get into it. Easier communications and support requirements (302)
- A strong orientation toward IBM due to application software compatibility. However, does not offer a technological edge (303)
- Expensive; fast but could not offer speed of Cray or ETA (304)
- No great shakes. Making noises about commitment to high-performance computing (305)
- Not in supercomputing market (306)
- Making a dent but markets more toward business than science (look where they are spending R&D money — in business, not sci/tech area) (307)

NEC
- Don't know much about them (301) (302) (303) (304) (305) (306)
- Only know of their disk drives (304)
- Powerful machine (307)

VENDORS — OVERALL IMPRESSIONS ONLY

AMDAHL
- Don't know much about them (301) (302) (306)
- Concerned about application software portability in IBM and DEC software environments (303)
- Seen as IBM look-alike; behind IBM in technology and offset by a lower price (304)
- Mainframes are a very good UNIX engine. VP not a big winner (possibly due to a compiler software problem); competes best only in easy-to-vectorize applications (305)
- Very impressive. But is similar to IBM. Needs more scientific application software. They would be strongly considered if they had $6 - $8 million to spend (along with IBM, of course). (307)

21. WHAT INDUSTRY SPECIFIC APPLICATIONS WERE IMPORTANT IN THE PURCHASE DECISION?

- ANSYS; PARTAN; STARDYNE; NASTRAN (Structural analysis) (301)
- NASTRAN (structural analysis) (304)
- ANSYS (mechanical analysis) (305)
- SYBIL (molecular biology) (302)
- None (work done in-house) (303) (307)
- Computational fluid dynamics (304)
- Quantum chemistry (306)
- Molecular modelling (306)
- Physics (307)
- Astronomy (307)
- Atmospheric sciences (307)

22. WHAT UTILITY SOFTWARE WAS IMPORTANT IN THE PURCHASE DECISION?

- FORTRAN (301)
- IMSL (301)
- Math/Statistical subroutines (301)
- None (302) (307) (308)
- Linear programming models (303)
- Matrix math routines (303)

- Matrix math subroutines (303)
- Automatic vectorizing FTN compiler (304)
- Excellent compilers (306)
- Profilers to allow optimum use of hardware (306)

24. GIVEN THE DIRECTION OF YOUR COMPANY AND INDUSTRY, WHAT DO YOU SEE AS THE TOP 3 SUPERCOMPUTER RERQUIREMENTS IN THE NEXT COUPLE YEARS?

More capacity/larger main memory - 2 (301) (307) Speed - 1 (301)
Compatible compilers that do better vectorizing - 2 (303) (304)
Better scalar performance - 1 (303)
More balanced performance - 1 (303)
More cost effective - 1 (304)
"Smaller faster cheaper" (306)
Faster I/O - 1 (307)
More reliable - 1 (307)
Less expensive, physically smaller, more reliable disk drives - 1 (307)
Not asked - 1 (305)

24. C. WHAT INDUSTRY SPECIFIC APPLICATION SOFTWARE WILL YOU NEED IN THE NEXT FEW YEARS?

- PACTRAN; NASTRAN; ANSYS (301)
- In-house developed software for electronic design (305)

33. A. HOW IMPORTANT IS THE PURCHASE PRICE IN THE DECISION TO PURCHASE A SUPERCOMPUTER?

Very important - 3 (304) (308) (309)
Medium importance - 3 (301) (302) (307)
Not very important - 1 (303)

33. B. WHY?

- Timing (during project life cycle) is more important
- Runs five-year cost of ownership (302)
- Not as important as operating costs (303)
- Cost/performance and accomplishing specific tasks are crucial (304)
- Everything is justified (307)
- Not asked (308)
- Purchase price determines key parts of payback (309)

34. A. HOW IMPORTANT IS OPERATING COST IN YOUR ORGANIZATION'S DECISION TO PURCHASE A SUPERCOMPUTER?

Very important - 1 (303)
Medium importance - 1 (302)
Not very important - 4 (301) (304) (307) (308)

34. B. WHY?

- All have similar operating costs (301)
- Use five-year cost of ownership (302)
- Tax laws for partnerships favor high purchase price and low operating cost (303)
- They don't ignore operating costs; but don't buy on the basis of lower op costs. Also facilities department pays for A/C and power, etc. (304)
- Power and A/C don't come out of their budget (307)
- For a government contract, operating costs are transparent (308)

34. C. WHAT ARE THE BENEFITS OF ONE VENDOR SELLING GENERAL PURPOSE MAINFRAMES AND SUPERCOMPUTERS?

Yes — if not a Japanese vendor, then seen as favorable.
Basically an IBM shop. (301)
Yes — clearly a benefit, less vendors to deal with (302)
Yes — benefit to company — less problems with communications (although not many problems now in that area) (304)
Benefit to users — won't have to learn a new operating system (304)
No — works in theory — one vendor for service and support.
In practice, he can't envision one vendor working effectively in sci/tech and business environments. Only one attempting to do it is Big Blue — but it doesn't mix. Try to run a sci/tech after the payroll program has crashed — the scientist/technologist won't even get on the system! (306)
Yes — one vendor service and support would be an advantage (307)
Not asked — 4 (303) (308) (309) (310)

D

Appendix: Questionnaire

QUESTIONNAIRE

Background

1.a. Does your firm have a supercomputer installed?
Yes ___ (To 1.b.) No ___ (To 1.c.) DK ___ NR ___

1.b. If Yes, what models? ______________________________

1.c. If No, are you planning to install a supercomputer?
Yes ___ (Continue) No ___ (To 2.d.) DK ___ NR ___

2.a. Do you plan to evaluate supercomputers for purchase within 1 year? Yes _____ (Go to 2.b.)
No _____ (Go to 2.c.)

2.b. (If Yes to 2.a.) For what reasons are you looking into purchasing a supercomputer? ______________________
____

2.c. (If No to 2.a.) Why are you not looking into purchasing a supercomputer? ______________________
____

2.d. Are you planning to purchase a minisupercomputer (i.e., one with less than 100 MFLOPS or less power than a Cray-1)? Yes ___ (To 2.e.) No ___ DK ___ NR ___

2.e. Why? ______________________________________
____

2.f. What other manufacturers' computers do you expect your supercomputer to share data with? 1. ______________
2. ____________ 3. ______________ 4. ____________

Qualification

3.a. At what level in your company is the ultimate or final decision made to purchase a supercomputer?
_____ Departmental
_____ Division
_____ Headquarters
_____ Other (Specify: ______________________________)

3.b. Who else makes the decision at the highest levels in your organization? Name: ________________________

3.c. Title: ________________________________

3.d. Organization (If different): ____________________

3.e. Telephone: ____________________________
(Don't forget the "country code," if applicable)

4. What is your area of expertise in the Company?
   ______ Operations/Manufacturing
   ______ Financial
   ______ Technical
   ______ Sales/Marketing
   ______ General Management
   ______ Other (Specify: ______________________________)

5. a. Were you involved in your company's decision to purchase a supercomputer?
   Yes ______ (Go to Q. 5.b.)
   No ______ (Please tell me who I should speak with.
   (Name: ______________________________ Phone: ____________)

5. b. What was your role in the supercomputer decision-making process?
   ______ Influencer ______ Analyst
   ______ Recommender ______ Approver
   ______ Administrative Role (Attended all meetings, etc.)
   ______ Purchasing Agent (STOP - Find a technical person)

Decision Criteria
----

6. When was purchase decision made?
   (Month, year) __________, 198__

7. a. Please tell me what your organization's top 3 supercomputer purchase decision criteria, in order of importance:

(1) ____
(2) ____
(3) ____

7. c. What other decision criteria would you consider important?

Other Criteria

____
____
____
____
____

[Prompts: Hardware; System Software; Application Software; Communications; Support]

8. a. Did your organization's decision criteria change during the process? Yes ________ No ________

8. b. If Yes, please describe the change(s). ______________
   ____
   ____

9. How important was each of the following individual factors in the purchase decision process? Please use a scale of 1 to 7 where "1 = very low importance" and "7 = very high importance."

PLEASE ADD: "This is not a rating of how good or how bad the vendor is -- rather, we're looking at the importance of each factor in the decision to purchase a supercomputer. "

FACTOR	RATING (1 to 7)
9. A. Overall	
1 System Performance	_______
2 System Price	_______
3 System Reliability	_______
9. B. Hardware	
1 Hardware Performance	_______
2 Main Memory Capacity	_______
3 CPU Reliability	_______
4 Peripherals Reliability	_______
5 Ease of HW Upgrade	_______
6 Requirement for High Speed Channel (>50 MB/sec.)	_______
9. C. System Software	
1 Interactive (vs. batch) operation	_______
2 Compatibility with existing mainframe O.S.	_______
3 Availability of performance tuning utilities	_______
4 Sys SW Maintenance/Support	_______
5 Quality of FORTRAN compiler	_______
6 Multiprocessing capability	_______
9. D. Application Software	
1 Availability of App. SW	_______
2 Avail of Graphics-based SW	_______
3 Ease of Application Software Development	_______
9. E. Communications	
1 Networking capabilities	_______
2 Supports Certain Protocols	_______

Which ones? ________ ________ ________ ________ ________ (Examples: Ethernet; SNA; X.25; DECnet; Async; MAP; HyperChanel; Bisyn; TCP/IP)

FACTOR	RATING (1 to 7)
9. F. System Support	
1 Training	_______
2 Documentation	_______
3 Quality of Bug Fixes	_______
4 On-Site Analyst Support	_______
5 Overall Field Service Capability	_______

Competitive Background Information

10. Which supercomputer vendors were initially considered?
 a. ______________________
 b. ______________________
 c. ______________________
 d. ______________________
 e. ______________________
 f. ______________________

11. Please list the three vendors who became finalists. Why was each selected?

	Vendor	Reason for Selection
a.	____________________	______________________
b.	____________________	______________________
c.	____________________	______________________

11. d. What effect did NEC and Amdahl selling a Japanese-made machine have on the purchase decision?
____
____
____

Competition

12. a. What supercomputer vendor do you perceive as the technology leader? ____________________

12. b. Why? ________________________________
____
____

13. Which supercomputer vendors would you rank as the "number two" and "number three" suppliers of leading edge technology?
 a. Number 2 = ________________________
 b. Number 3 = ________________________

14. Please describe the "company personality" for each of the following supercomputer vendors:

	Vendor	"Personality"
14.a.	Cray	______________________
14.b.	IBM	______________________
14.c.	Amdahl	______________________
14.d.	NEC	______________________
14.e.	ETA	______________________
14.f.	CDC	______________________
14.g.	Add:________	______________________

____
____

We're now going to discuss specific competitors in the supercomputer market.

15. a. What do you think of Cray in the supercomputer business? ______

______

15. b. Will Cray be able to continue to compete successfully?
Yes ___ (To 15.c.) No ___ (To 15.c.) DK ___ NR ___

15. c. Why? ______

______

15. d. What are Cray's strengths? ______

______

______

15. e. What are Cray's weaknesses? ______

______

______

16. a. What do you think of ETA in the supercomputer business? ______

______

16. b. Will ETA be able to compete with Cray and others?
Yes ___ (To 16.c.) No___ (To 16.c.) DK ___ NR ___

16. c. Why? ______

______

______

16. d. What are ETA's strengths? ______

______

______

16. e. What are ETA's weaknesses? ______

______

______

17. a. What is your impression of IBM in the supercomputer market? ______

______

17. b. Will IBM be able to compete with Cray and others?
Yes ___ (To 17.c.) No___ (To 17.c.) DK ___ NR ___

17. c. Why? ______

______

______

17. d. What are IBM's strengths in the supercomputer market? ____________________

17. e. What are IBM's weaknesses in the supercomputer market? ____________________

18. a. What do you think of NEC in the supercomputer market?

18. b. Will NEC be able to compete with Cray and others?
Yes ___ (To 18.c.) No___ (To 18.c.) DK ___ NR ___

18. c. Why? / Why not? ____________________

18. d. What are NEC's strengths in the supercomputer mrkt?

18. e. What are NEC's weaknesses in the supercomp. market?

18. f. What has NEC done to address these weaknesses?

19. a. What do you think of Amdahl in the supercomputer market? ____________________

19. b. Will Amdahl be able to compete with Cray and others?
Yes ___ (To 19.c.) No___ (To 19.c.) DK ___ NR ___

19. c. Why? ____________________

19. d. What are Amdahl's strengths? ____________________

19. e. What are Amdahl's weaknesses? ____________________

19. f. What has Amdahl done to address its weaknesses?

Reference Accounts

20. a. Did your company request reference accounts from the finalists?
Yes ___ (Go to Q. 20.b.) No ___ DK ___ NR ___

20. b. If Yes, did you check with any of these accounts?
Yes ___ (Go to Q. 20.c.) No ___ DK ___ NR ___

20. c. Please summarize the key comments about each vendor.

	Vendor	Comments
1		
2		
3		
4		

Application Software

21. a. What industry-specific applications were important in the purchase decision? ________________

____

21. b. Why? ________________

____

21. c. What utility software was important in the purchase decision? ________________

____

21. d. Why? ________________

____

Pricing

22. What was the target price for your system?
$________________

23. How much did you budget annually for follow-on purchases of:

a. Hardware (including peripherals)? $__________
b. System Software? $__________
c. Application Software? $__________
d. Hardware Maintenance? $__________

Future User Needs

24. a. Given the direction of your company and industry, what do you see as the top 3 supercomputer requirements in the next 2 years?

____

____

____

24. b. Why? ______________________________________
____
____

24. c. What industry specific application software will you need in the next few years? ____________________
____
____

24. d. Why? ______________________________________
____
____

25. a. Will you purchase additional supercomputers in the next 1-2 years? Yes _____ (To Q. 25.b.) No ______

25. b. Do you plan to upgrade the CPU within 1-2 years? Yes ______ (Go to Q. 25.c.) No ________

25. c. (If Yes) Please describe the planned upgrade/next purchase. ______________________________
____

Sales Process
----

26. a. First Contact: (Month, year) ________, 198__

26. b. How long was the decision cycle? _____ months

27. a. Was each vendor represented by the same sales representative during the entire process?
Yes___ No ___ Don't Know ___ No Response ___

b. How many times altogether were you contacted by the sales rep from each of the 3 finalist vendors?

Vendor	# of contacts

27. c. How frequently were you contacted by each of the following groups:
27.c.1. Sales/Marketing __________
27.c.2. Technical Support __________
27.c.3. Executive Visit __________

28. a. Which vendor best handled the process? __________

28. b. Why? ______________________________________

29. Please provide general comments about the sales reps from each of the finalists.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

NOTE: You may use the following prompts:

- Product knowledge
- Understanding of your application
- Follow-up
- Management of the sales process

Benchmarks

30. a. Did your Company require benchmark tests?
Yes _______ (Go to Q. 30.b.) No _______

30. b. Please give me the good points and bad points of _______ (Insert as appropriate: NEC's / ETA's / IBM's) benchmark tests.

30.b.1 Good: ____________________

30.b.2 Bad: ____________________

30. c. Please give me the good points and bad points of _______ (Insert as appropriate: Amdahl / IBM / ETA / Cray) benchmark tests.

30.c.1 Good: ____________________

30.c.2 Bad: ____________________

31. a. For your particular benchmarks, which vendor's system ran fastest? Next Fastest? Third Fastest?

First ____________________

Second ____________________

Third ____________________

31. b. Which vendor did the most professional job in benchmarking? ____________________

31. c. Why? ____________________

31. d. Was the major benchmark criteria:
31.d.1. System throughput? ____________
31.d.2. Current single job performance? _________
31.d.3. Performance for anticipated job mix? ______
31.d.4. Combination of above? _________

Pricing
----

32. a. Was the price negotiated?
Yes ___ (to 32.b.) No ___ DK ___ NR ___

32. b. What was the list price? $_______________

32. c. What was the discount range? ______%

Cost of Acquisition
----

33. a. How important was the overall purchase price in your organization's decision to purchase a supercomputer? _____________________________________
____

33. b. Why? ____
____
____

Cost of Operation
----

34. a. How important was the operating cost, including electrical and cooling costs, in your organization's decision to purchase a supercomputer?
____
____

34. b. Why? ____
____
____

34. c. What are the benefits to your organization if one vendor sold and supported both general purpose computers and supercomputers? ___________________
____
____

System Performance
----

35. a. Has your ______________ (fill in) CPU performed as expected? Yes ___ No ___ DK ___ NR ___

35. b. What areas surpassed expectations?

____

____

____

35. c. What areas have not met your expectations?

____

____

____

Other
-----

36. a. We've talked about a number of areas. Do you have anything to add? Yes ______ No _______

36. b. Additional: ____

____

____

____

____

____

____

____

____

____

____

THANK YOU VERY MUCH FOR YOUR COOPERATION.

CONFIDENTIAL

INPUT QUESTIONNAIRE

CATALOG. NO. Z A M D
SIC. CODE
SIZE CODE
AREA CODE
STUDY CODE
DATES 0 8 8 7
MM DD YY

STUDY TITLE:
TYPE OF INTERVIEW: ☐ VENDOR ■ USER ☐ TELEPHONE ☐ ON-SITE ☐ MAIL

INTERVIEWER: ____

COMPANY: ____ CO. TYPE: ____

ADDRESS: ____ SALES: ____

NO. EMPL: ____

INDUSTRY ■

☐ Discrete Manufacturing
☐ Process Manufacturing
☐ Transportation
☐ Utilities
☐ Telecommunications
☐ Distribution
☐ Banking & Finance
☐ Insurance
☐ Medical
☐ Education
☐ Services
☐ Federal Government
☐ State & Local Government
☐ Other Industry Specific

INTERVIEWS

NAME	TITLE	TELEPHONE NO.

SUMMARY ____

REFERENCES ____